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The Effect of Fiscal Policy on Output in Times of Crisis and Prosperity: Historical Evidence From Greece

By

George Chouliarakis, Tadeusz Gwiazdowski, Sophia Lazaretou

Centre for Growth and Business Cycle Research, Economic Studies,
University of Manchester, Manchester, M13 9PL, UK

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THE EFFECT OF FISCAL POLICY ON OUTPUT IN TIMES OF CRISIS AND PROSPERITY: HISTORICAL EVIDENCE FROM GREECE*

George Chouliarakis[I] Tadeusz Gwiazdowski[II†] Sophia Lazaretou[III]

[I]*Ministry of Finance, Greece*[‡]
[II]*The University of Manchester*
[III]*Bank of Greece*

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Abstract

Empirical analysis of a unique and unexplored historical dataset for Greece provides new insight into the state and regime dependence of the government spending multiplier. Greece fought numerous wars between the establishment of the modern Greek state and the outbreak of World War II. Using data for both armament and disarmament, and controlling for states and regimes in the economy, our empirical findings suggest that the exchange rate regime, the presence of exchange controls, and the business cycle all have a significant impact on the size of the government spending multiplier. However, analysing the *interaction* of these states and regimes turns out to be crucial to removing the bias from our multiplier estimates. In particular, regardless of other states and regimes in the economy, the multiplier is estimated to be zero during good times. In contrast, it is well above unity when spending decreases in a recession.

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† Corresponding author: Tel: +447514819456, Email: Tadeusz.Gwiazdowski@manchester.ac.uk.
‡ Additional affiliations: Chairman of the Council of Economic Advisers, Greece, and The University of Manchester.

1. Introduction

Inaccurate estimates of fiscal multipliers can lead to unanticipated and sub-optimal policy outcomes. Analysis of growth forecast errors between 2009 and 2013 revealed that fiscal multipliers were much larger than initially assumed (Blanchard and Leigh 2013). For example, in Greece between 2008 and 2016, the imposition of deep spending cuts and large tax increases coincided with economic output shrinking by more than one quarter, and employment by one third. In efforts to optimise future policy choices by improving estimates of fiscal multipliers, crucial research progress has been achieved since the initial fiscal stimulus packages of 2008. A stylised fact has emerged that there is not one fiscal multiplier but many (Blanchard and Leigh 2013, Ilzetzki et al. 2013, Nakamura and Steinsson 2014). In these papers, and many others, fiscal multipliers have been shown to be state- and regime- dependent due to both country characteristics and temporary factors such as: the choice of exchange rate regime, trade openness, the level of development, the debt-to-output ratio, the level of inequality, the amount of slack in the economy, the design of fiscal packages, and whether fiscal policy is expansionary or contractionary.

The main purpose of this paper is to analyse how the government spending multiplier varies across states and regimes in an economy. There are two crucial reasons that justify our decision for choosing Greece as our working template. The first is the availability of a unique and previously unexplored dataset for historic Greece between 1846 and 1938 that contains *ten* war episodes (world wars, local hostilities and revolts) corresponding to military build-ups (Table 1). Our data for military build-ups allows us to use military spending as an instrument for government spending to identify exogenous fiscal policy shocks. This provides us with a rare country case study through which to analyse how the government spending multiplier varies over time in a single country over a long time horizon (for other examples, see Barro and Redlick 2011 and Owyang et al. 2013). Second, it is a country with a rich history not only of wars but financial crises, multiple switches of exchange rate regimes, and significant variation of output across the business cycle. Therefore, the turbulent monetary history of the fledgling Greek nation state also offers a suitable testing ground to analyse the non-linearity of the government spending multiplier, namely its variation across different states and regimes in the economy. For example, between 1846 and 1938 Greece switched between fixed exchange rate regimes (membership of a metallic currency standard) and floating exchange rate regimes (fiat

money) no less than *fourteen* times (Table 2). In addition, analysis of the Greek business cycle reveals significant fluctuations with almost as many years of output expansion as contraction. Finally, two separate periods of exchange controls are identified in our sample (Table 3).

It remains an open question as to how the effectiveness of fiscal policy varies over time and between countries. Another crucial and largely unexplored question for policy makers is the extent to which different country characteristics and temporary factors *interact* with one another and which of these country characteristics and temporary factors may exert the most important influence upon the size of the fiscal multiplier at any given time. So far, attempts to analyse the true extent of the state and regime dependence of the multiplier have proven difficult due to the need to implement advanced econometric techniques and also due to the lack of adequate data to implement these methods. The use of military spending as an instrument for government spending is a frequently used approach to identify exogenous fiscal policy shocks; however, a key drawback of this approach is that large wars are relatively infrequent (Nakamura and Steinsson 2014). The large number of wars in our dataset and the frequent switches between different economic states and regimes put us in a unique position to address some of these outstanding research issues.

In particular, our dataset spans from shortly after the formation of the modern Greek state in 1830 to the outbreak of World War II and it is part of a larger, newly built, macro history database for seven south-east European countries (SEEMHN 2014). This dataset has three key advantages to other studies. First, the exceptionally large number of war episodes and the associated military build-ups make our instrument strong. In comparison, a similar methodology for the US (see Hall 2009, Barro and Redlick 2011, Ramey 2011, Owyang et al. 2013) suffers from the problem of relying upon only three large military build-ups in the twentieth century (i.e. the two World Wars and the Korean War). Attempts to use military spending as an instrument in US samples after 1953 therefore encounter a weak instrument problem. Second, so far historical research has largely focused upon core economies such as the US and the UK (see Barro and Redlick 2011 and Crafts and Mills 2013, 2015) or on a wide panel of countries over a short time period such as the interwar period (see Almunia et al. 2010). In contrast, this paper aims to gauge the size of the fiscal multiplier for the case of a small, peripheral, developing, and relatively closed economy, over a long time horizon. Third, and more importantly, it gives us the opportunity to analyse how the fiscal multiplier varies

depending upon the prevailing states and regimes in the economy, and crucially, how these states and regimes interact with one another to affect the size and the sign of the multiplier.

Our results support the existence of a stylized fact that there is not one fiscal multiplier but many. In line with previous research, we find that the prevailing exchange rate regime, the presence of exchange controls, and the output gap, all have a significant effect upon the size of the fiscal multiplier. However, we also show that taking into account how country characteristics and temporary factors interact is crucial when estimating the size of the multiplier. In particular, fiscal policy seems to be ineffective during good times. By contrast, when there is a negative output gap, fiscal stimulus packages have, at best, a moderate effect upon output while fiscal consolidation leads to an estimated fiscal multiplier that is well above unity.

The rest of this paper is structured as follows. Section 2 discusses historical and recent developments in the literature on the effectiveness of fiscal policy as a stabilization tool. Section 3 provides an overview of the unexampled dataset used in our analysis. Section 4 outlines the econometric method employed and presents the empirical findings while Section 5 discusses the received evidence. Section 6 concludes.

2. A Brief History of Fiscal Multipliers

The early pioneers of research into the potential for using fiscal policy as a stabilisation tool largely started with studies of the Great Depression. An early contribution came from Brown (1956) who concluded that fiscal policy would have been a strong recovery tool in the US during the Great Depression if only it had been tried. This conclusion was supported by Peppers' (1973) subsequent study. Despite some seminal contributions to the literature on fiscal policy, including Ramey and Shapiro (1998) and Blanchard and Perotti (2002), research interest into fiscal policy, and particularly attempts to estimate fiscal multipliers, increased dramatically in the wake of the 2008 financial crisis. The use of fiscal policy as a stabilisation tool across the OECD countries during the period of the Great Recession, and the subsequent move to fiscal consolidation from 2010, have sparked significant interest into the exact size and the sign of the fiscal multiplier. Early contributions included Hall (2009) and Barro and Redlick (2011) using a long time-series for the US. Studies of fiscal policy during the interwar years included

Gordon and Krenn (2010) for the US, Crafts and Mills (2013) for the UK, and Almunia et al. (2010) for a short wide panel of countries (see Table 4 for details).

Parallel to this period there was significant research progress into the econometric methodologies that could be used to estimate a non-linear multiplier. A central focus of many new papers was whether fiscal policy was more effective during recessions than expansions. Using non-linear econometric models, a large body of research concluded that fiscal multipliers were larger during recessions (see Auerbach and Gorodnichenko 2012*a,b*, Batini et al. 2012, Baum et al. 2012, Blanchard and Leigh 2013, and Jordà and Taylor 2013); however, there were certainly some exceptions (see, for example, Ramey and Zubairy 2014). Furthermore, there was significant evidence that the prevailing exchange rate regime also affected the size of the fiscal multiplier (Corsetti et al. 2012, Ilzetzki et al. 2013). Beyond this, a host of other country characteristics and temporary factors were found to have important impacts on the size of the multiplier. The main country characteristics included: trade openness, labour market rigidity, the size of automatic stabilisers, debt-to-output ratios, the level of development, the level of wealth inequality, and the composition of fiscal stimulus and consolidation packages (see Ilzetzki et al. 2013, Batini et al. 2014, Brinca et al. 2016). Furthermore, temporary factors beyond the state of the economy were also found to be important. These included whether spending was increasing or decreasing (Riera-Crichton et al. 2015) and the degree of monetary accommodation to fiscal shocks.

The quantitative economic history literature responded to this progress with a new series of papers that addressed many relevant issues. In particular, Owyang et al. (2013) for the US and Canada, and Crafts and Mills (2015) for the UK attempted to estimate the fiscal multiplier across business cycle regimes. Furthermore, Ramey and Zubairy (2014) found no robust evidence that the fiscal multiplier was larger when there was a zero lower bound on interest rates in the US. However, a limitation of this new literature, both historic and contemporary, was that there were limited attempts to estimate the extent of the non-linearity of the fiscal multiplier, often due to data constraints. Given significant theoretical and empirical evidence that the multiplier was non-linear, recent research has not yet answered the question of which country characteristics and temporary factors might be most important at any given time and how these might interact with each other. For example, if the position of the business cycle exerts an important influence on the effectiveness of fiscal policy, is its effectiveness greater or smaller across different country characteristics such as the prevailing exchange rate regime, and

across temporary factors such as whether fiscal policy is expansionary or contractionary? We begin to address these questions below.

3. Data

The history of Greece is rich with debt defaults, multiple switches on and off metallic standards, and political or military events. Pre-WWII Greece was a typical peripheral developing and inflation-prone country that tried many times to end the history of political and macroeconomic instability through its participation in a monetary stability club of powerful economies. In this way, it enhanced market credibility and gained cheaper capital market access. It is this dynamic history that allows us to analyse the size of the government spending multiplier in a multi-dimensional framework.

3.1 Main Variables

Until recently, due to data scarcity, Greece's experience has remained largely unexplored both internally (see Bank of Greece 2009, 2011) and internationally (see, in particular, Mazower 1991 and Kalyvas 2015). To conduct any econometric exercise that allows us to safely arrive at certain policy conclusions, we need to rely on sound data. To this end, during the last decade, significant efforts have been made to produce a reconstructed and reliable compilation of long-run historical time-series for key Greek macroeconomic variables using the latest statistical methods (see Kostelenos et al. 2007, Prontzas et al. 2012 and Lazaretou 2014). In this paper, we rely on five key macroeconomic variables: nominal GDP, the GDP deflator, population, primary government spending and military spending. GDP was computed 'based on estimates made directly using the production (value added) method, the most notable exception being the analysis of the tertiary sector, where a combination of the income method and of an indirect approach has been used' (see Kostelenos et al. 2007, p.251). GDP at constant 1914 prices was assessed using the GDP deflator (1914=100). The latter is a Paasche type index of the prices of 10 products from the primary and the secondary sector and covers over 23% of the total value of GDP. Data on nominal GDP and the GDP deflator are taken from Kostelenos et al. (2007). Population figures are annual with entries based upon the censuses being mid-year estimates and referring to the de facto population associated with the specific makeup of the country at any given time. Reports on primary spending quote figures for central government expenditure, exclusive of interest payments on domestic and foreign debt, and is directly retrieved from the Government Annual Reports. Military spending data, also retrieved from the Government

Annual Reports, include realised expenses on equipment (build-ups), on civil and military personnel, such as wages, salaries, pensions and veteran benefits, education projects and camps maintenance, as well as refugees' resettlement (see Lazaretou 2014). In other words, they refer to both investment and consumption. This is why in our sample high military spending also occurred outside of war episodes per se. Finally, a set of dummy variables is also inserted in our analysis to be used either as control variables or to address the non-linearity of the government spending multiplier (see below).

3.2 War Episodes

A narrative evaluation of Greek history shows that by the end of the 1930s the country had been involved in no less than ten war episodes (see Table 1). These include frequent hostilities with the Ottoman Empire, the Balkan Wars, and World War I. A meaningful overview of Tables 1 and 2 highlights that the identified war episodes would often coincide with the exit of the country's currency from its currency peg. One potential drawback of using military build-ups to estimate fiscal multipliers is highlighted by Ilzetzki et al. (2013). They observe that in the US wars had been predominantly fought on foreign soil. By contrast, in developing countries most wars were fought on domestic soil and involved significant losses of productive capital; in such cases it is not possible to use the military build-up approach to estimate fiscal multipliers. However, our narrative evaluation shows that the Greek wars during our sample period were predominantly fought outside of the country's existing territory and thus they did not lead to any significant losses of productive capital. However, immediately after the conclusion of wars, Greece experienced important territorial enlargements and sudden population increases. These placed a burden on the government's budget for the new provinces' reconstruction and for the country's rearmament. We control for the subsequent changes in population by employing per capita variables throughout our analysis. We also construct a dummy variable for the years Greece underwent territorial expansion (EXP) to control for any possible structural adjustment costs these might have had.

3.3 Exchange Rate Dates: The Adventures of the Drachma

The history of the exchange rate of the drachma reveals a continuous cycle of attempts to peg the currency to the prevailing metallic standard (see Table 2). The driving motivation for adhering to a metallic convertibility rule comes from the desire to gain access to international capital markets and reduce the inflation bias of domestic policy makers (see Bordo and Rockoff 1996). This was the case in 1867, when Greece signed the Latin Monetary Union agreement;

in 1885 and again in 1910, when it joined the classical gold standard; in 1928, when it entered the interwar gold-exchange standard, and in 1933, when it joined the Gold Bloc. Greece always made strenuous efforts to rebuild its creditworthiness following the four debt defaults in 1826, 1843, 1893 and 1932. In particular, a debt compromise on past foreign loans was reached in 1864 (final settlement of the 1832 loan); in 1878-79 (final settlement of the 1824-25 loans); in 1898[1], following the 1893 foreign debt repudiation; and again in 1935, following the 1932 unilateral debt default.

However, all attempts to adopt a specie standard ultimately failed. The country's failure cannot only be attributed to the occurrence of some sudden event, such as war, but to the government's inability to pursue fiscal and monetary policies compatible with its commitment to fixed rates (Lazaretou 2005*a,b*). Therefore, economic conditions in Greece were set against a volatile monetary environment and frequently a violent political background. They were largely determined by the interplay between fiscal imbalances and monetary disturbances. The unwillingness of spendthrift governments to undertake a radical budget reform resulted in frequent convertibility and confidence crises that negatively affected the country's economic development process. Hence, in our econometric analysis, a dummy variable (PEG) is inserted that takes the value one during years that Greece adhered to a currency-peg exchange rate regime in order to gauge the non-linearity of the government spending multiplier across regimes.

3.4 Exchange Controls

One unique feature of historic Greece is that we can identify two periods of exchange controls. Table 3 summarises the dates when exchange controls were in place. Previous studies of the fiscal multiplier have not analysed the importance of exchange controls as a key country characteristic that could influence the effect of fiscal policy on output. Exchange controls could potentially signify a period of crisis or instability, or alternatively act as a signal that the economy had become relatively more closed to trade whilst they were in place. Both economic instability and low trade openness have been found in previous studies to lead to a larger

[1]In February 1898, for a second time, International Finance Control (IFC) was established by law. The first time was in 1856, after the 1843 default; its role was rather advisory and was short-lived. By contrast, in 1898, the IFC committee, which was in effect until the outbreak of WWII, took full control and management of public finances in the context of a strict and long-lived stabilisation programme which included: fiscal consolidation, a monetary squeeze, persistent deflation and heavy currency appreciation up to the original parity. Recession hit the economy and lasted several years. Ultimately however, Greece consistently pursued, for the first time ever, a specie standard rule until as late as 1910; only four years before the collapse of the classical gold standard.

multiplier. Therefore, our intuition might be to expect that the government spending multiplier will be larger during the times that exchange controls were in place. To this end, we add a dummy variable (EC) that takes the value one during the years the exchange controls were in force. It is used to analyse whether exchange controls might have had an effect upon the size of the government spending multiplier.

3.5 Business Cycles and the Output Gap

A simple inspection of the Greek historical GDP data series shows that Greece experienced almost as many years of positive per capita GDP growth rate as negative. One way to conduct a simple analysis of the history of the Greek business cycle is to conduct a Markov-switching analysis for Greece akin to the US study conducted by Hamilton (1989). The initial purpose of such an analysis is to identify whether states in our per capita GDP growth variable resemble business cycles or rather an alternation between periods of slow and fast growth rates or even long-term changes in trends. Table 5 presents the results which are qualitatively similar to those of Hamilton (1989). The equation we estimate in our Markov-switching analysis of the business cycle is given by:

$$\dot{Y}_t = \beta_{00} + \beta_{01}\dot{Y}_{t-1} + S_t\left(\beta_{10} + \beta_{11}\dot{Y}_{t-1}\right) \qquad (1)$$

The dependent variable in all regressions is the growth rate of real GDP per capita, i.e. $\dot{Y}_t = (Y_t - Y_{t-1})/Y_{t-1}$, S_t=0 or 1 and denotes the unobserved state of the system, and β_{00} and β_{10} are constant terms in states 0 and 1 respectively. When employing Markov analysis to the Greek GDP historical data series, the process identifies two regimes, one with mean positive growth of 2.65% per annum lasting 5.8 years and one with negative growth of 7.6% per annum lasting 1.5 years (see Table 5, states 1a and 1b). In other words, the process identifies business cycles rather than slow and fast growth rates or long-term changes in trends. The focus of our study in this paper is the effect of Greek fiscal policy on output in times of crises and prosperity. As discussed in detail above, there is now a large body of research that suggests fiscal multipliers are non-linear and the extent of this non-linearity depends upon several country characteristics and temporary factors such as the business cycle. Therefore, we extend our Markov-switching equation to include a government spending term:

$$\dot{Y}_t = \beta_{00} + \beta_{01}\dot{G}_t + \beta_{02}\dot{Y}_{t-1} + S_t\left(\beta_{10} + \beta_{11}\dot{G}_t + \beta_{12}\dot{Y}_{t-1}\right) \qquad (2)$$

In equation (2) the independent variable of interest is now the growth rate of per capita government spending in units of output, i.e. $\dot{G}_t = (G_t - G_{t-1})/Y_{t-1}$[2]. We use equation (2) to investigate whether there is any evidence of non-linearity in the government spending multiplier. The results of this exercise are clear, conclusive, and in line with recent research. We initially exclude the lagged dependent variable and the Markov-switching exercise identifies a high multiplier regime and a low multiplier regime. The high multiplier is above 2 and is highly statistically significant, whereas the low multiplier is very small in absolute value and statistically insignificant (see states 2a and 2b in Table 5). When the lag of output growth is included as an additional control variable the high multiplier regime corresponds to a state in which there is negative average output growth, whereas the low multiplier regime corresponds to periods of positive average growth rates (see states 3a and 3b in Table 5). This exploratory analysis is highly indicative of a non-linear government spending multiplier in our data sample from historic Greece.

A final and important contribution to our dataset is a measure of the output gap from Chouliarakis (2012) that applies the dynamic factor methodology to a large set of macroeconomic aggregates compiled from a wide range of historical sources (see, in particular, Sarferaz and Uebele 2009). The data series used to generate our output gap variable span key sectors of the economy and include fiscal variables, monetary aggregates, external sector variables, and financial indicators. The output measure produced in Chouliarakis (2012) is found to track very closely the existing real GDP data figures retrieved from the full set of national accounts estimates for the early post-WWII period. This allows backcast estimates of real GDP for the pre-WWII period. The standard estimation method of dynamic factor models involves maximising the likelihood function by means of the Kalman filter. In turn, applying the common dynamic factor methodology to long-run macroeconomic time series produces a historical 'state of the economy index' for Greece – a measure that is germane to the concept of business cycle as defined by the NBER. Using this 'state of the economy index' we formulate a negative output gap dummy variable (NOG) that takes the value 1 during periods when the Greek economy had a negative output gap.

[2]This implies a direct estimate of the government spending multiplier in our coefficient on β_1. This is the same variable specification as Hall (2009), Barro and Redlick (2011), Owyang et al. (2013) and Ramey and Zubairy (2014).

Much recent literature has focused upon whether and how the fiscal multiplier varies across recessions and expansions. The availability of the above output gap measure is therefore a significant advantage to our analysis. In our Markov-switching analysis we can generate the probability of being in a high multiplier and a negative output growth rate regime or a low multiplier and a positive growth regime. We impose exogenously our negative output gap dummy to see whether the probability of being in a high multiplier and a low growth rate regime corresponds to the economy experiencing a negative output gap that year. The results are presented in Figure 1. It is striking that the probability of being in a high multiplier regime corresponds several times to periods of a negative output gap. In fact, of the 15 peak probabilities (above 0.5) of being in a high multiplier regime, 12 occur in the presence of a negative output gap. There are also a significant number of years - above 10 - where the probability of a high multiplier regime does not rise above 0.5.

4. Econometric Method

Numerous methodologies have been proposed and attempted in recent years to accurately identify exogenous fiscal policy shocks. These include: the VAR methodology of Blanchard and Perotti (2002), the narrative method (see Ramey and Shapiro 1998, Romer and Romer 2010, Ramey 2011), the growth forecast error method (Blanchard and Leigh 2013) and the use of average treatment effects by Jordà and Taylor (2013). Each method has its merits and drawbacks despite the attempts of numerous authors to build upon these methods. Often the choice of methodology is dependent upon data availability. In this paper, the availability of annual data over a very long time horizon gives us the chance to apply the methodology of Barro and Redlick (2011)[3], which and can be described by the following linear regression specification:

$$\dot{Y}_t = \beta_0 + \beta_1 \dot{G}_t + \varepsilon_t \qquad (3)$$

The dependent variable is the growth rate of real output per capita, $\dot{Y}_t = (Y_t - Y_{t-1})/Y_{t-1}$, β_0 is a constant term, whilst ε_t is an error term. The independent variable is the growth rate of per capita government spending in units of output, i.e., $\dot{G}_t = (G_t - G_{t-1})/Y_{t-1}$. This implies a direct estimate of the government spending multiplier in the coefficient on β_1. The problem of identification arises

[3]A similar methodology has also been used by Hall (2009) and more recently by Crafts and Mills (2013) and Owyang et al. (2013).

because government spending is endogenous in equation (3). It is unclear whether increased government spending increases output or whether spending is pro-cyclical and increases as output increases. Following Blanchard and Perotti (2002), one solution to this problem is to use military spending as an instrument for government spending. As discussed above, Greek history is punctuated by numerous military conflicts. This allows us to identify exogenous government spending shocks and to use military spending as a valid instrument. The primary reason we can use military spending as an instrument is that it is exogenous to the business cycle. War episodes in Greece, and thus military build-ups, were caused by geopolitical events rather than related to the business cycle. This implies that we are seeking to estimate how effective government spending could have been if it had been used as a stabilisation tool, and that we are using military spending as a proxy for the effectiveness of civilian fiscal policy.[4]

It remains to show that military spending is indeed a valid instrument for government spending. As depicted in Figure 2, military spending and primary government spending are highly correlated over the sample period. In addition, Figure 3 shows that military build-ups correlate closely with the dates of war episodes listed in Table 1.[5] It is largely uncontroversial that military spending is exogenous to the business cycle and depends only on geopolitical events. However, it is still the case that a sample period that includes wars may see an economy undergo significant adjustment. Among other factors to consider, this includes a more elastic labour supply via a surge of patriotism, rationing affecting consumption, and higher taxes and government borrowing to fund increased military spending. The net effect of these factors on the value of spending multiplier is debatable. The exclusion of taxes is likely to lead to a downward bias in estimates of the government spending multiplier (see Hall 2009).[6] Based both on economic intuition and statistical tests, our military spending series provides a strong instrument for government spending. Therefore, we use Two-Stage least squares (TSLS) in our analysis. Our baseline result that includes only a contemporaneous government spending term in equation (3) gives a spending multiplier of 0.36. Including a lagged output term, the estimated value increases to 0.39. Both estimates are significant at the 5 per cent level.

[4] For the potentially different effects of civilian versus military spending see Perotti (2014).
[5] An exception is 1898. We note that per capita military spending peaked that year while a brief war between Greece and Turkey occurred just a year before, in 1897. This mismatch can be explained by the fact that, according to the provisonal peace agreenent of September 1898, Greece as the loser was agreed to pay a huge war indemnity to Turkey, the total amount of which was shown in the 1898 military spending data figure.
[6] A comparison of the results of Hall (2009) and Barro and Redlick (2011) seems to support this view. Although they use a slightly different sample period, the estimates of Barro and Redlick – including a tax variable – are 0.59-0.77, whereas those of Hall that exclude a tax variable are 0.36-0.55.

4.1 The Non-linear Government Spending Multiplier

To begin our analysis of the potential non-linearity of the government spending multiplier for Greece, we introduce a Threshold Autoregressive model. Equation (3) becomes:

$$\dot{Y}_t = \beta_{00} + \beta_{01}\dot{G}_t + \beta_{02}\dot{Y}_{t-1} + I_t\left(\beta_{10} + \beta_{11}\dot{G}_t + \beta_{12}\dot{Y}_{t-1}\right) \qquad (4)$$

The key variable in this specification is the dummy variable I_t, which represents either a temporary factor such as the economy's position in the business cycle or a country characteristic as the prevailing exchange rate regime. In other words, it allows us to estimate how the coefficient on the government spending term varies across country characteristics and temporary factors. In our initial set of results we insert four dummy variables: (i) a currency peg dummy variable (PEG), (ii) an exchange controls dummy (EC), (iii) a negative output gap dummy (NOG) (all of which were described in the previous section) and (iv) a fiscal consolidation dummy (FCON) that takes the value one during the years when government spending growth was negative. For example, using the PEG dummy, the coefficient on β_{01} provides the estimate of the government spending multiplier when the country was on fiat money, whereas the coefficient on β_{11} provides the estimate during the years the country was on a currency peg.

Using equation (4) we obtain our first non-linear estimates of the government spending multiplier. These are presented in Table 6. In line with our expectations, and the results of several previous studies, the exchange rate regime, exchange controls, and the output gap are all found to have a non-linear effect upon the government spending multiplier. In particular, the multiplier takes a statistically significant positive value under a currency peg (0.387), while it is statistically insignificant when the country was on a fiat money standard. In the absence of exchange controls the multiplier becomes zero, but it increases to a positive and statistically significant value (0.768) when controls were in place. Finally, under a negative output gap, the estimated multiplier is positive and highly statistically significant but still well below unity (0.666), whereas in the years of a positive output gap it is statistically zero.

4.2 The Government Spending Multiplier and Regime Interaction

Our results so far suggest that the exchange rate regime, exchange controls, and the output gap can influence the size of the multiplier at any given time. We now delve deeper into

understanding how the interaction of various country characteristics and temporary factors might affect the sign and the size of the estimated multiplier. We proceed to interact two 'regimes' or 'states' of the economy, namely $I_{1,t}$ and $I_{2,t}$ at any given time. To this end, we estimate the following equation:

$$\begin{aligned}\dot{Y}_t &= \beta_{00} + \beta_{01}\dot{G}_t + \beta_{02}\dot{G}_t I_{1,t} + \beta_{03}\dot{Y}_{t-1} + \ldots \\ &+ I_{2,t}\left(\beta_{10} + \beta_{11}\dot{G}_t + \beta_{12}\dot{G}_t I_{1,t} + \beta_{13}\dot{Y}_{t-1}\right)\end{aligned} \tag{5}$$

By including the multiplicative interaction term $\dot{G}_t \cdot I_{1,t}$ on the right hand side of equation (5), we can include two dummy variables in each regression. This means each regression estimates *four* different government spending multipliers. Given there has been such interest into how the fiscal multiplier varies across the business cycle, we initially define $I_{1,t}=NOG_t$. In each of our regressions $I_{2,t}$ will change between the dummy variables for the currency peg, the presence of exchange controls, and fiscal consolidation.

The results of this analysis are striking. We find that regardless of the exchange rate regime, the presence of exchange controls, or whether fiscal policy is expansionary or contractionary, the government spending multiplier is small and statistically insignificant under a positive output gap. In addition, under a negative output gap it increases slightly but is still statistically insignificant under: a fiat exchange rate regime, without exchange controls, and when fiscal policy is expansionary. Nevertheless, our results show that the multiplier does become larger and highly statistically significant in three regimes: under a negative output gap and a currency peg (0.656), under a negative out gap and exchange controls (0.802), and, finally, under a negative output gap when spending is contractionary (1.727) (see Table 7).

Table 7 includes all the possible remaining regime interactions. The results have several defining features. In most cases increases in government spending do not have a large or significant effect upon output. However, we find that both under exchange controls (0.450), and a currency peg (0.464), the government spending multiplier becomes positive and highly statistically significant when government spending increases. This suggests that under certain conditions increases in government spending can have a positive effect upon output but the multiplier is well below unity. In addition, throughout our sample we find that government spending is ineffective under a fiat exchange rate regime. This comes with the qualification that

under a fiat exchange rate regime with exchange controls the multiplier can once again have a larger effect upon output. Therefore, summing up, we found that at different times the output gap, the exchange rate regime, whether spending is increasing or decreasing and the presence of exchange controls can all have a significant effect upon the size of the government spending multiplier.

5. Discussion

To correctly gauge the correct sign and size of the government spending multiplier at any given time, it is essential to accurately identify the key country characteristics of the economy, and the state of temporary factors such as the position of the output gap. We recall that previous empirical studies have identified the exchange rate regime, the position of the output gap, and whether spending is increasing or decreasing, as significant influences upon the sign and size of the government spending multiplier. Our paper has gone beyond these studies and found that not only are several country characteristics and temporary factors important, but how they interact is very likely to be a crucial guide for policy makers when estimating fiscal multipliers. For example, the presence of an exchange rate peg significantly increases the effects of government spending on output, but only when there is a negative output gap. Exchange controls are also important; but to correctly anticipate the extent to which fiscal policy shocks will have a significant effect on output we need to consider at the same time the position of the output gap and whether fiscal policy will be expansionary or contractionary.

It would be very interesting to investigate this further and see how multiple regimes interact with one another. This goes beyond the scope of this paper due to the constraints of data availability. Attempts to reconcile this problem have been proposed by Batini et al. (2014), who propose a ‘bucket method’ to estimate the multiplier based upon country characteristics and temporary factors when there is limited empirical evidence, or data availability, in a specific economy. As the paper itself says, this is a ‘starting point’, but it is also important to bear in mind that although a country may have several properties that suggest the multiplier should be high, the effect of the interaction of different country characteristics may be highly non-linear. As a thought-provoking example, the presence of a sovereign debt crisis could simply ‘turn off’ any positive benefits from fiscal stimulus regardless of the other country characteristics and the temporary factors an economy possesses; even if all other country characteristics and temporary factors suggest fiscal multipliers may well be large. This clearly warrants further research.

This study also highlights the important role quantitative economic history can potentially play in guiding current policy. The parallels between the historic Greece used in our study and Greece today are striking. Throughout its history Greece has been a peripheral European economy, this is as much the case today as it was between the birth of the Greek nation state and World War II; for example between 1870 and 1939 Greek per capita GDP remained consistently below 50% of the average of the G-4 economies (Figure 4). Additionally, Greece had persistently maintained an inefficient tax collection system where the ratio of government spending to tax revenue has remained persistently above unity and had at times grown significantly higher (Figure 5). The economy experienced four debt defaults in our data sample. As a result, it was subject to the imposition of an IFC for public debt management. Finally, Greece continually strove to adhere to a currency peg. This allowed it access to international capital markets and acted as a commitment device to remove the inflation bias of domestic policy makers. Despite the significant development of the Greek economy between the end of our sample and today, the striking parallels to Greece today suggest that a quantitative analysis of the country's economic history could have been a significant aid to policy design during the recent sovereign debt crisis. This seems especially significant when the estimate of the effect of reductions in government spending under a negative output gap correspond closely to subsequent revisions in estimates of fiscal multipliers from around 0.5 to above unity (see Blanchard and Leigh, 2013). Overall, our results are highly pertinent given the recent experience of the Greek economy. The imposition of large spending decreases and tax rises correlate strongly with the large fall in output experienced. Had policy-makers been aware of the historical evidence, this might have acted as a strong deterrent to the imposition of deep and front-loaded austerity measures at an early stage of the contraction.

Most importantly, the empirical findings imply that an economy with a history of persistent sovereign debt crises should act with caution when implementing expansionary fiscal policy. This is because despite the fact that Greece was a small, relatively closed economy with a negative output gap, and a fixed exchange rate regime (all factors pointing towards a high multiplier), our results suggest a positive fiscal stimulus might well have only a limited positive effect on output with significant crowding out of private spending. The results show that the effect of an increase in government spending on output are either statistically zero or well below unity when statistically significant. These results might be explained in the following way. Greece was a country in sovereign default for around 50% of the time period under

consideration. Therefore, when spending increased, private individuals would have reacted in a highly Ricardian manner, expecting resulting tax increases, a loss of lifetime income, and thus spending increases would have had large crowding out counter-effects. Accordingly, with limited access to financial markets, Greece could issue debt to finance a deficit only at a very high interest rate, which displaced (crowded out) output and thus decreased the size of the multiplier. Moreover, the scope for deficit monetisation was very limited since the country was not allowed, at least by the 1898 IFC, to create seigniorage. Finally, the assumption that taxes often rise at the same time as government spending and affect output within the same year implies that the spending multiplier is not equal to a pure deficit-financed one. This means that the overall effect of spending on output depends on whether the increase in spending will be financed by tax hikes or debt issuance. Hence, the value of the multiplier may well reflect the effect of different ways to finance the shock in spending.

Narrative accounts verify this assertion. For example, coping with the interwar crisis, Greece financed moderate spending through tax increases and internal short-term debt issuance at very high interest rates since the country was shut out of foreign capital markets after its 1932 default. Moreover, monetary policy continued to be tight since the drachma was still on a currency peg after its entrance to the Gold Bloc in 1933. In contrast, spending decreases are likely to have had direct and strong negative demand effects on the economy throughout most of our sample and would have been similar to the fiscal multiplier in the traditional Keynesian sense. Further, fiscal consolidation would have been unlikely to have large confidence effects due to Greece's persistent problems in balancing the government budget.

6. Conclusion

We have analysed a previously unexplored historical dataset for the Greek economy between 1846 and 1938 using military spending as an instrument for government spending to estimate the sign and size of the government spending multiplier. Like previous studies, we have estimated the effect of government spending on output whilst controlling for key country characteristics, such as the prevailing exchange rate regime and the presence of exchange controls, and also temporary factors, such as the position of the output gap and whether spending is increasing or decreasing. However, we have moved beyond many previous studies and analysed how these various country characteristics and temporary factors interact with one another at any given time. In particular, we find that the country's prevailing exchange rate

regime, the exchange controls regime, the position of the output gap, and whether spending is increasing or decreasing are all very important factors that affect the sign and size of the government spending multiplier. More importantly, we have shown that considering regime or state interaction turns out to be crucial in removing the bias from the multiplier's point estimate. Overall, the results are highly pertinent given the recent experience of the Greek economy. Our empirical findings imply that large spending cuts correlate strongly with a large fall in output when there is a negative output gap. Concerning the future, they further suggest that an economy with a history of persistent sovereign debt crises should act with caution when implementing expansionary fiscal policy.

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Table 1: Dates of War Episodes

War Episodes	Period
Anglo-French Occupation of the Port of Piraeus	1854- 1857
The Cretan Revolt	1868-1869
Russo-Turkish War	1877-1878
Military Tension with the Ottomans - Transfer of Thessaly and a part of Epirus to Greece	1880-1881
Military Tension with the Ottomans - Mobilisation-War Averted	1885-1886
Greco-Turkish War	1897
Balkan Wars	1912-1913
Greek Neutrality – WWI	1914-1916
Greece Enters WWI on the side of the Entente	1917-1918
Asia Minor Campaign	1919-1923

Source: Authors' compilation.

Table 2: Dates of Exchange Rate Regimes

Exchange Rate Regime	Period
Bimetallism	1833-1848
Suspension of Convertibility	1848
Bimetallism	1848-1868
Suspension of Convertibility	1868-1870
Bimetallism	1870-1877
Suspension of Convertibility	1877-1884
Gold Standard	1885
Suspension of Convertibility	1885-1910
Gold Standard	1910-1919
Suspension of Convertibility	1919-1928
Gold-exchange Standard	1928-1932
Suspension of Convertibility	1932-1933
Gold Bloc	1933-1936
Collapse of the Gold Bloc	1936
Sterling Area	1936-1939

Source: Authors' compilation.

Table 3: Dates of Exchange Controls

Exchange Controls	Period
Period 1	1914-1926
Period 2	1931-1938

Notes: *Period 1:* On 21 July 1914, controls were imposed on gold outflows. Free inflows were allowed. On 20 November 1920, controls were imposed on foreign exchange outflows. Bank deposits in drachmas were not allowed to be converted into foreign exchange; all bank deposits denominated in foreign currency should be converted into devalued drachmas. Outflows for the payment of imported goods were allowed. In 1919, controls were imposed on both money and capital outflows and trade inflows as well. In September-December 1922, a tax on export profits was levied, that is all exporters were required to make a compulsory deposit of their foreign exchange receipts in drachmas; all commercial banks were required to make a compulsory deposit of 15% of their daily foreign currency purchases at the National Bank of Greece, i.e. the note-issuing bank in the absence of a central bank. In April 1923, as the drachma exchange rate fluctuations were sharp, exchange controls were replaced by an extensive and heavy control system on trade inflows (tariffs, quotas and duties). In September 1925, police repressive measures were taken against exchange brokers; the government tried to manipulate the free exchange rate of the drachma aiming at the closing of the free market.

Period 2: From 26 September 1931 to October 1932 a generalised control system was introduced. The Bank of Greece (i.e., the country's central bank from 1928) was not obliged any more to redeem its banknotes in gold-convertible foreign currency; all deposit accounts in foreign currency were converted into devalued drachmas; Greek citizens were not allowed to transfer money abroad; exporters were required to convert their revenue into drachmas. In 1937, the above mentioned control regime was expanded to all money and capital outflows. The imposition of a dictatorship in August 1936 allowed for a widespread and rigorous enforcement of the control system.

Sources: Bank of Greece, *Monthly Statistical Bulletin* (1929-1939), and National Bank of Greece, *Annual Reports* (various issues).

Table 4: Summary of Previous Results

Study	Country/Group	Method	Data	Spending Multiplier
Almunia et al. (2010)	27 Country Panel	2SLS	1925-1939	1.1-2.2
Barro and Redlick (2011)	US	2SLS	1917-2006	0.59-0.77
Crafts and Mills (2013)	UK	OLS	1922:Q1-1938:Q4	0.3-0.8
Gordon and Krenn (2010)	US	VAR	1939:Q1-1941:Q4	0.9-1.8
Hall (2009)	US	2SLS	1930-2008	0.55
Business Cycle Regimes				
Auerbach and Gorodnichenko (2012b)	US	STVAR	1947Q1-2008Q4	No Recession: 0-0.5 Recession: 1-1.5
Baum et al. (2012)	G7 (except Italy)	VAR	1965:Q2-2011:Q2	No Recession: 0.72-0.78 Recession: 1.22-1.34
Owyang, Ramey, Zubairy (2013)	Canada	Jordà (2005)	Quarterly 1921:1-2011:4	No Recession: 0.44-0.49 Recession: 0.65-1.6
	US		Quarterly 1890:1-2010:4	No Recession: 0.72-0.93 Recession: 0.76-0.83
Exchange Rate Regimes				
Corsetti et al. (2012)	17 Country Panel	Two-Stage Strategy	Annual 1975-2008	Floating -0.2-0 Fixed 0.6-1.1
Ilzetzki et al. (2013)	44 Country Panel	VAR	1960:Q1-2007:Q4	Floating 0.14-(-1.69) Fixed 0.15-1.4
Pro/Counter-cyclical Multipliers				
Riera Critchon et al. (2015)	29 OECD Countries	Jordà (2005)	1986-2008 Semi-Annual	No Recession and Expansion: 0 No Recession and Consolidation: 0 Recession and Expansion: 0.68 Recession and Consolidation: 0.76

Table 5: Markov-Switching Analysis

Dependent variable:	$\dot{Y}_t$					
State:	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Switching regressors						
c	2.646*** (0.817)	-9.756*** (1.935)	1.424 (1.431)	-1.398 (2.025)	2.886** (1.152)	-2.060 (1.497)
$\dot{Y}_{t-1}$	-0.207 (0.073)	-0.288 (0.116)			-0.284 (0.106)	-0.212 (0.103)
$\dot{G}_t$			-0.053 (0.139)	2.183*** (0.809)	-0.037 (0.112)	2.243*** (0.451)
Regime probabilities	0.832 0.690	0.168 0.310	0.680 0.442	0.320 0.558	0.680 0.442	0.320 0.558
Expected durations (years)	5.846	1.453	2.514	1.582	3.124	2.261

Note: *,**,*** indicates 10%, 5%, 1% statistical significance of the government spending multiplier.

Table 6: The Non-linear Government Spending Multiplier

Sample	1846-1938							
Regime	Peg=0	Peg=1	EC=0	EC=1	NOG=0	NOG=1	FCON=0	FCON=1
c	0.022	0.032	0.027	0.03	0.056	-0.003	0.053	-0.008
	(0.012)	(0.011)	(0.01)	(0.019)	(0.013)	(0.012)	(0.014)	(0.016)
$\dot{G}_t$	0.219	0.387*	0.168	0.768***	0.073	0.666***	0.201	-0.161
	(0.191)	(0.203)	(0.121)	(0.224)	(0.087)	(0.135)	(0.186)	(0.222)
$\dot{Y}_{t-1}$	-0.282	-0.520	-0.386	-0.464	-0.439	-0.463	-0.411	-0.465
	(0.107)	(0.055)	(0.079)	(0.11)	(0.05)	(0.118)	(0.083)	(0.112)
EXP	-0.088	-0.3	-0.215	-0.091	-0.32	-0.074		-0.176
	(0.028)	(0.101)	(0.096)	(0.029)	(0.109)	(0.037)		(0.083)
R^2	0.186	0.522	0.28	0.698	0.533	0.369	0.240	0.354
n	42	51	75	18	50	43	45	48

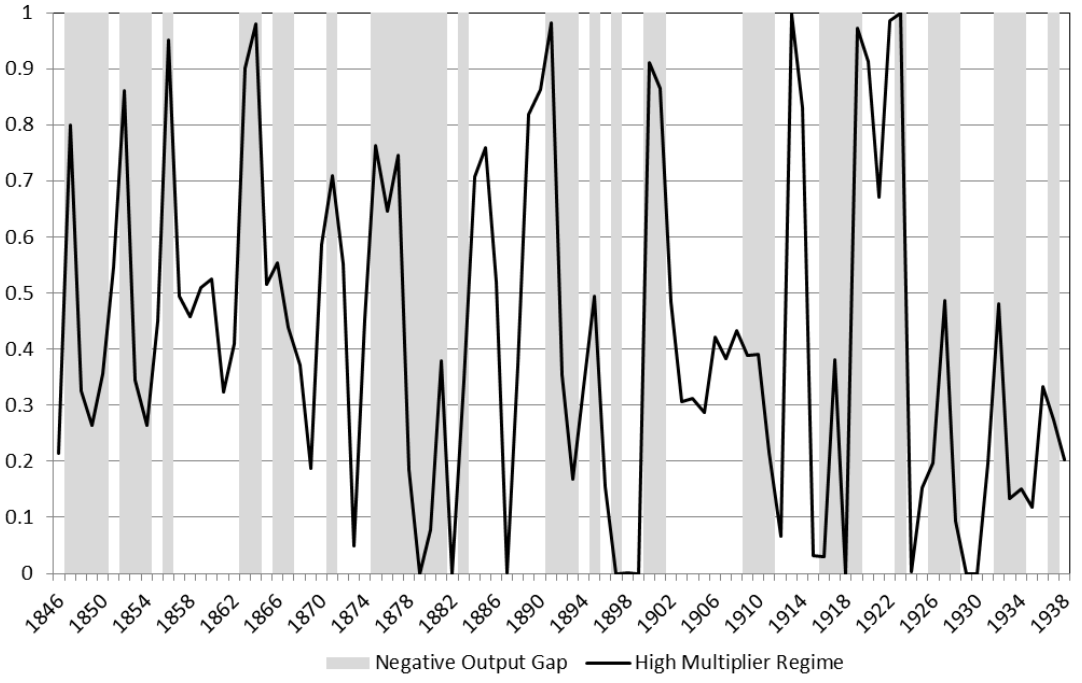
Note: *,**,*** indicates 10%, 5%, 1% statistical significance of the government spending multiplier.

Table 7: The Non-linear Government Spending Multiplier – Regime Interaction

Sample	1846-1938					
Regime	NOG=0	NOG=1	FCON=0	FCON=1	EC=0	EC=1
FCON=0	0.124	0.249				
	(0.128)	(0.229)				
FCON=1	-0.189	1.727**				
	(0.143)	(0.663)				
EC=0	0.144	0.249	0.259*	0.037		
	(0.120)	(0.255)	(0.133)	(0.043)		
EC=1	-0.119	0.802***	0.450***	2.185*		
	(0.561)	(0.259)	(0.094)	(1.082)		
Peg=0	0.113	0.377	0.179	0.260	0.095	1.928***
	(0.153)	(0.376)	(0.222)	(0.568)	(0.165)	(0.401)
Peg=1	0.176	0.656***	0.464***	0.145	0.237	0.589***
	(0.167)	(0.086)	(0.167)	(0.153)	(0.214)	(0.066)

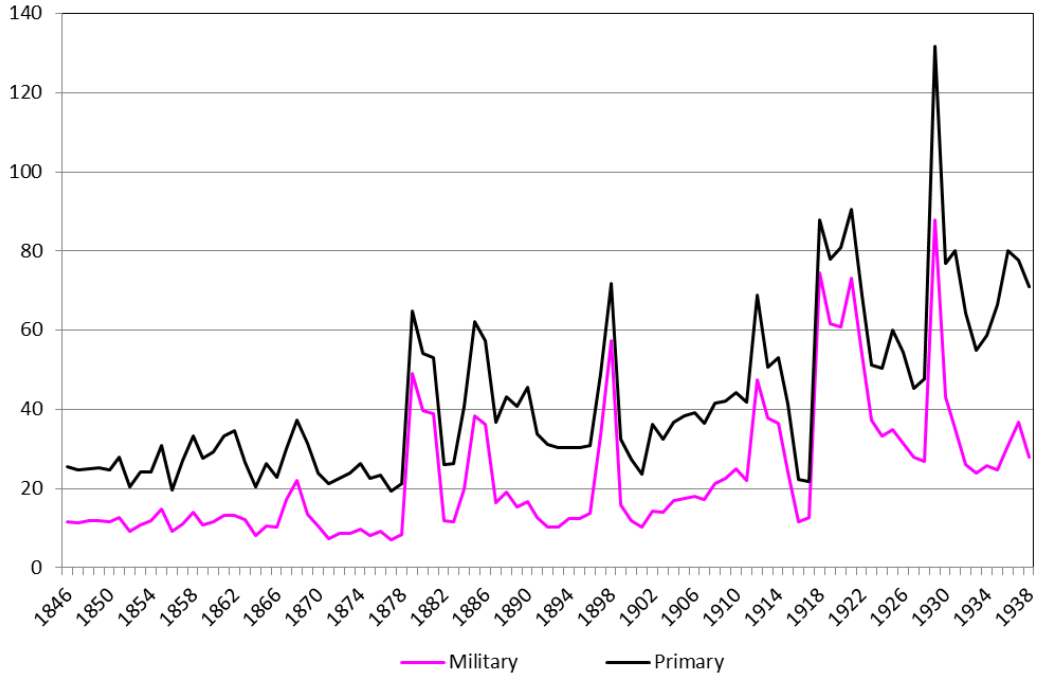
Note: *,**,*** indicates 10%, 5%, 1% statistical significance of the government spending multiplier.

Figure 1: Probability of a high multiplier regime and negative output gap dummy (1846-1938)



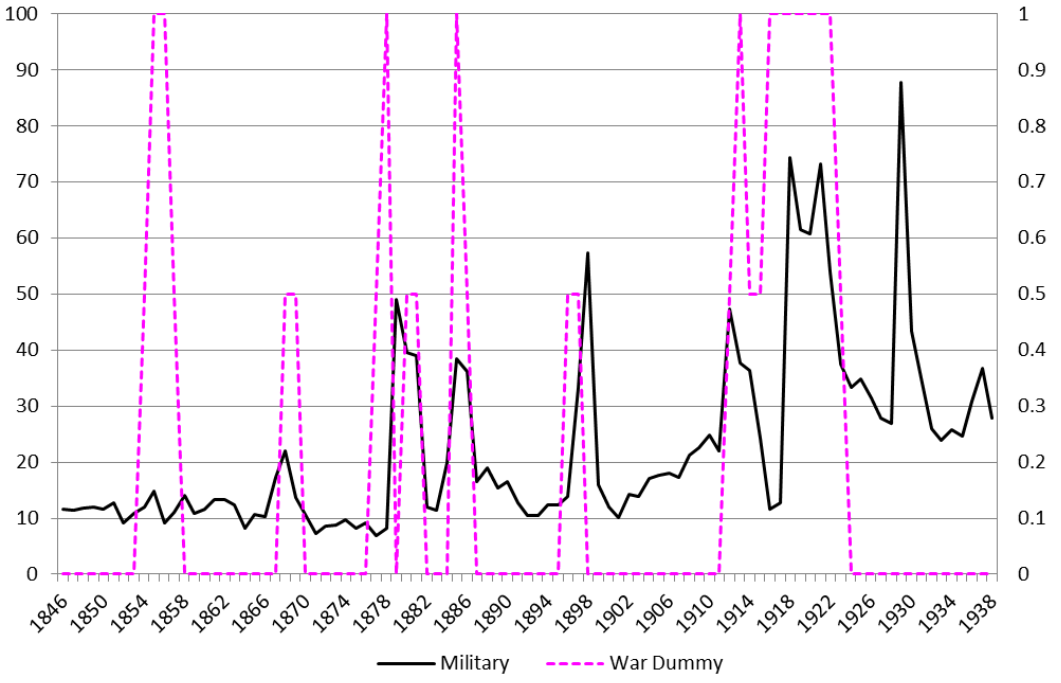
Notes: The black line reflects the probability of being in a high multiplier regime. The shaded grey areas are imposed exogenously to the Markov-Switching process; yet, the probability of being in a high multiplier regime often corresponds closely with periods of a negative output gap.
Source: Own calculations.

Figure 2: Military spending and primary spending (Greece, 1846-1938)



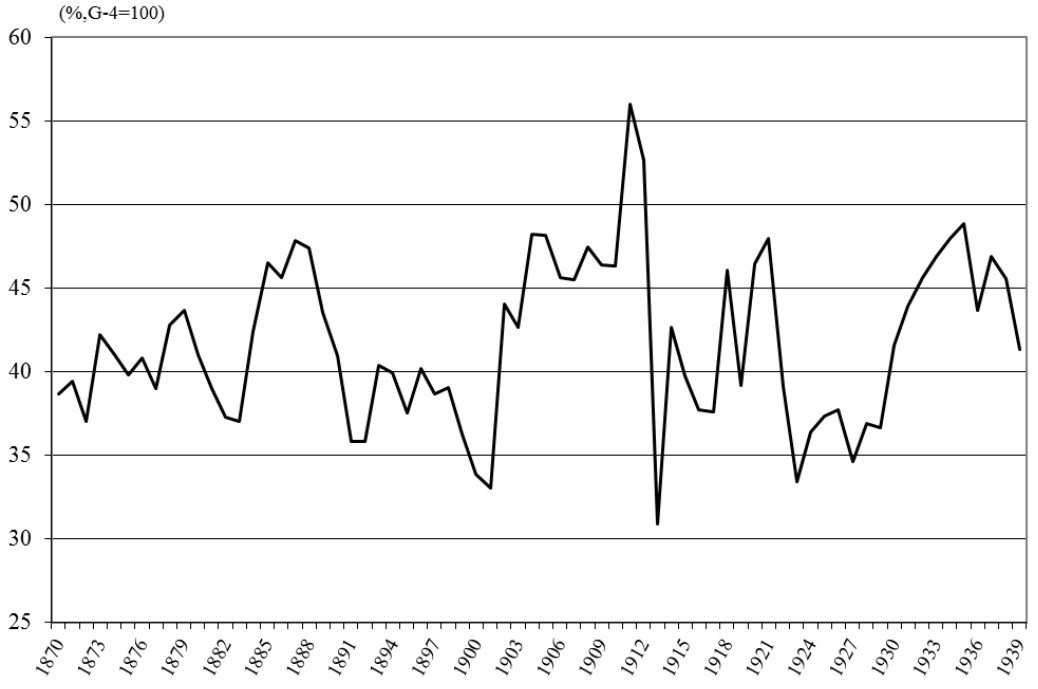
Note: per capita, at constant 1914 prices.
Source: Own calculations based on data from Lazaretou (2014).

Figure 3: Military spending and dates of war episodes (Greece, 1846-1938)



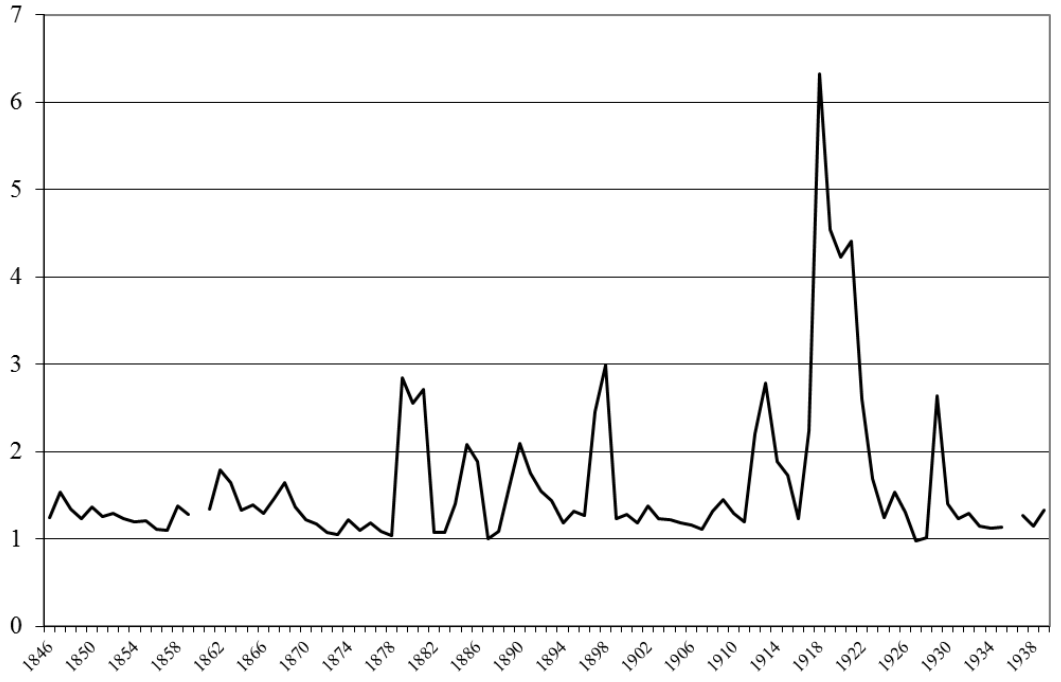
Note: per capita military spending at 1914 constant prices=LHS, war dummy=RHS.
Source: Own calculations based on data from Lazaretou (2014) and Table 1.

Figure 4: Real per Capita Income, 1870-1939 - Greece versus G-4



Notes: In international 1990 US dollars. G-4 is the average of the annual levels of real per capita income of the UK, the US, France and Germany.
Source: Own calculations based on data from Kostelenos (2007), Maddison (2004) and NBER Historical Database.

Figure 5: Government Spending over Tax Revenue, 1846-1939



Notes: In current LMU drachmas, realised primary spending (interest payments are excluded), received tax revenues, central government.
Source: Own calculations based on data from Kostelenos (2007), Maddison (2004) and NBER Historical Database.