Political instability and economic growth at different stages of economic development: Historical evidence from Greece

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Abstract

This study explores the relationship between political instability and growth within the perspective of Greece's modern history. The narrative approach is used to identify major events of political unrest which took place in the period from 1833 onwards. Econometric estimates show that political instability exerts an adverse effect on economic growth. Likewise, poor economic performance raises the likelihood of political instability. Their relationship is not uniform across time but strengthens only after the second half of the 20th century. The impact of political instability is conditional on the stage of economic development with the most harmful effect taking place in the phase of rapid industrialization. When distinguishing between permanent and temporary effects of political instability, a strongly negative effect is observed on the growth rate of potential output and an insignificant impact on the cyclical component of GDP. Political instability is unfavorably affected by the growth rate of potential output.

Keywords: Political instability; stage of development; state capacity; economic growth; Greece

JEL classification: N10, O43, O47

1 Introduction

The idea that political instability affects growth is well documented in the economics' literature (Alesina et al. 1996). Most of the existing empirical research explores the influence of political instability within a cross country setting and offers evidence in favor of a strongly negative effect on growth. Incidents of political violence such as civil wars, coups and mass demonstrations exert an adverse influence on economic activity.

A variety of indicators have been proposed to model the influence of political instability. Composite indices encompassing information on the number of assassinations, protests and coups were created by Venieris and Gupta (1983; 1986) and Gupta (1990). Alesina et al. (1996) classified political instability in two distinct categories: the first emphasizes on the propensity of government change which can be constitutional or unconstitutional, while the second is related to events of political violence and social unrest. Alesina and Perotti (1996) measured sociopolitical instability only with indices that capture violent events including information on the number of politically motivated assassinations, the number of people killed in incidents of domestic mass violence, the number of successful and unsuccessful coups and on whether a country is democratic or not. Klomp and de Haan (2009) distinguished four areas of political instability. The first is called aggression and is correlated with guerrilla, revolutions and internal conflict. The second is called protest and relates to strikes, riots and anti-government demonstrations. The third is regime instability and is associated with coups, regime durability and constitutional changes while the fourth is called government instability and is correlated with polarization and political cohesion. Jong-A-Pin (2009) also identified four major areas of political

instability. These are: politically motivated violence, mass civil protest, instability within the political regime and instability of the political regime.[1]

Given that continuous time series indicators of political instability are scant, the existing research compares economic performance based on cross country observations. However, the time period under examination is usually short and does not allow us to distinguish whether the effects of political instability change over time. It also remains unclear to what extent political risk affects long run performance or impacts temporarily on short term fluctuations. Equally important, the impact of political risk on economic growth is heterogeneous and therefore the estimated slope coefficients of cross-country studies should be interpreted as mean effects which could vary systematically between countries at different stages of economic development.

Unlike most studies using cross country indices, I assess the causal inter-relationship between political instability and economic growth within the historical context of a single country. I create a unique hand-collected indicator of political instability that extends over an extremely long time horizon of 183 years (1833-2016). The narrative approach is used to identify major events of political violence that took place in Greece's modern history from 1833 onwards, soon after its liberation from the Ottoman Empire. The history of Greece is rich in episodes of violence which have been manifested in coups (successful or unsuccessful), civil war, revolutions, mass demonstrations etc. Along with an index of regime vulnerability, these events are combined into a single indicator to evaluate the effects of political instability on

[1] Other measures of political risk are derived from respondents' perceptions on various dimensions of political stability (see the Business Environment Risk Intelligence or the International Country Risk Guide). However, these indicators are often viewed as subjective given that the respondents' answers usually align with the economic conjecture.

economic performance. This definition of instability (coups, civil war, revolutions and mass demonstrations, regime vulnerability) is closest to the idea of Barro (1991) of using political risk as a measure for the protection of property rights. Appendix A1 narrates in detail all major events of political instability that dominated Greece's history after the liberation from the Ottoman Empire in 1830 (for a detailed coverage of all major events in the modern history of Greece see Koliopoulos and Veremis 2009).[2]

The use of time series data allows us to answer questions that have not been raised so far. First, I ask if political instability and economic growth are mutually determined. Though this issue has already been explored, the evidence provided so far is mixed (see Londregan and Poole 1990; Alesina et al. 1996; Campos and Nugent 2002) and the use of long time series data will help us uncover the nature of this relationship within a single-country setting. Besley and Persson (2009) highlight that the utilization of the time-series experience of countries that have built legal and fiscal institutions would be fruitful to provide more convincing evidence as regards the origins of state capacity. The historical context of Greece offers a unique case to explore how do the endogenous determinants of state capacity (growth and instability) co-evolve over time.

Second, while a theoretic and empirical link has been established between political instability and growth in cross country studies (see Table 1 for a brief review of the existing empirical research), little is known if this relationship holds at different

[2] Despite its turbulent political life, the country managed to remarkably raise its living standards and move from the laggards of Europe to the club of the richest countries of the world. At the same time Greece became a liberal democracy with powerful institutions that protect citizens' human rights.

stages of economic development. The deleterious effect of political instability is more likely to take place in industrialized countries at late stages of development. Investment spending in capital intensive countries raises the importance of political instability as a facilitator of the uninterrupted and efficient provision of property rights. By contrast, its damaging effect could not be decisive in underdeveloped agrarian economies as the importance of investment for growth is negligible for such countries. A common feature usually shared by less developed agrarian economies is the large share of the population that is living in villages and works in the home production sector. Self-consumption of the household production is high, especially in rural areas, while the potential home production surplus is exchanged through barter, rather than the market system. In this case, the existence of an efficient system of property rights is not crucial as a high proportion of daily exchanges takes place informally. The present paper is a first study that systematically tries to establish a convincing relationship between political instability and economic growth at different stages of economic development. Greece shares some characteristics that make it a unique case study: a) its history is rich in episodes of political instability and b) it is a representative case of a middle-high income country that shared all features of an agrarian home production economy, soon after its liberation from the Ottoman Empire in 1830 and transited towards industrialization in the second half of the 20th century.

Third, I ask if the effects of political instability on growth are temporary or last over the long run. While prior literature has documented a robust relationship between political instability and economic growth little is known on the mechanisms through which these effects take place. I therefore distinguish between permanent

effects of political instability on potential output and temporary influences on cyclical gross domestic product (GDP). Last but not least, the effect of political instability on growth is evaluated against the influence of indicators that capture other shocks related to economic crisis, war and dictatorship.

This study theoretically relies upon the framework of state capacity of Besley and Persson (2009) to understand the historical interactions between political instability, property rights and growth within the context of modern Greece. I focus on specific aspects of political instability to support that growth (and growth enhancing institutions) is endogenously constrained by the state's legal and fiscal capacity. Then, these factors are brought under the unified historical framework of Greece leading to empirically testable predictions.

I estimate a structural two-equation econometric model in which the endogenous variables are output per capita growth and political instability. Three stage least squares econometric estimates verify the adverse effect of political instability on economic performance and point to a negative impact of growth on political unrest. This relationship is not uniform but changes over time. Political instability and growth were not significantly associated until the second half of the 20th century. The empirical analysis suggests that the effect of political instability is conditional on the level of economic development with the most harmful impact taking place at the stage of rapid industrialization of the Greek economy in the second half of the 20th century. To raise the reliability of the obtained estimates, I provide difference in differences econometric evidence which show that the harmful impact of the revolutionary events of 1848 was more pronounced in high income countries of

continental Europe. Unlike studies that establish only a significant short-run effect on output (Campos et al. 2020), I show that instability matters more for long run economic growth. Estimates show that political instability exerts a strongly negative effect on potential GDP growth and an insignificant impact on cyclical output. Likewise, political instability is unfavorably affected by potential output growth.

The rest of the paper is organized as follows: section 2 discusses the link between political instability, state capacity and economic growth within the context of Greek history. Section 3 describes the econometric specification. Section 4 presents the empirical results. Section 5 concludes.

2 Political instability, state capacity and economic performance within the historical perspective of Greece

Greece, soon after its liberation from the Ottoman Empire in 1830, became a recognized state under the name 'Kingdom of Greece'. The new state included only a small part of its present territory, the regions of Peloponnese, Cyclades and a part of Central Greece. Greece's economy at that time was underdeveloped and heavily dependent on rural activities. It is interesting to note that until the agricultural reform of 1871, the property rights' regime was similar to that of feudalism, where the state owned all the national land and rented it to its cultivators, who had no rights over the land they cultivated.[3]

However, the land ownership status remained unclear for another 50 years as the small family property in Southern Greece that came from the distribution of

[3] The agricultural reform of 1871 marks the first step towards integration of the Greek economy into the capitalist system after provision of land ownership rights to landless cultivators.

national lands in 1871 coexisted with large land ownerships (tsiflikia) in the region of Thessaly of central Greece.[4] The process of distributing land ownership rights was a rather long and gradual process that lasted almost a century (1828-1922). Peculiarities of the institutional framework and heterogeneity of the property regime existed in Greece for over a century, creating a barrier to the development of capitalist relations in agriculture (Sakellaropoulos 2006). Without individual ownership, the cultivators lacked any incentive to make profit, could not borrow capital or attempt any improvement in their estates.[5]

Hatzis (2019) notes that the nineteenth century was a period of a slow modernization of the country's economic structure and institutions. During this period and up to 1922 the main priority of major political forces was dominated by the irredentist idea of the enlargement of the Greek state to include all lands, under Ottoman rule, inhabited by large Greek-speaking populations. This entailed the build of a relatively large, yet inefficient, public administration and an active policy of nationalist expansion that ultimately put an excessive burden upon the Greek economy which undermined its financial stability. Military competition promoted by the idea of enlargement could have an effect on the late modernization of the Greek economy. Petmezas (2003) notes that a large part of the foreign debt contracted at that time was directed to and uselessly spent in military oriented objectives. Changes

[4] The annexation of the regions Thessaly in 1881 which was accompanied with the creation of tsiflikia brought dramatic consequences for the local cultivators, who no longer enjoyed the privileges granted to them by the Ottoman law and gradually became ordinary peasants. Unequal distribution of land was followed by a period of prolonged conflict between landless peasants (koligi) and large land owners (1881-1910) shocking the social and political life of that time (Patronis 2015).

[5] The large budgetary expenditure of the Greek state which were to a large part covered by the use of lands as collateral for future loans is a factor that contributed to the maintenance of the status of national lands.

in monetary and fiscal policy and sudden swifts in exchange rate regimes were frequent and usually caused by military needs (Lazaretou 2014). The public finances of that period were very bad and there was always a need for external borrowing. It is noteworthy that by 1893 the newly formed Greek state had already gone bankrupt three times.

Major political forces during the 19th century did not allow the adoption of a free market model but preferred to give a central role to the state (Zolotas 1926). Only a minority of political parties argued that modernization of the Greek economy should first take place, however this policy did not become dominant until the end of the Asia Minor catastrophe in 1922. During the 19th and the first half of the 20th century, Greece was a rural economy (with an agricultural share in GDP higher than 50%), dominated by undercapitalized small family farms, absence of technology, low productivity and exports of labour intensive products of arboriculture (Petmezas 2006). One should add the poor transport and public infrastructure until the last two decades of the 19th century. The industrial sector of Greece grew very slowly and the reasons for this were mainly lack of capital investment (Mouzelis 1978) and absence of a clear and well-defined property rights framework (Sakellaropoulos 2006).

A number of political and institutional factors impeded Greece's transition towards capitalism and industrialization. Mouzelis (1978) notes that one of the main differences of the Greek State in relation to that of other modernized European states was its functioning under irrational standards which was characterized by over-expansion of the government sector and outdated structures which were completely inconsistent with those of countries in Western Europe who had already succeeded in

this field at the time of the Industrial Revolution. Besides, most of this era is characterized by tumultuous political life. Major disagreements between political groups, national schism between the elected government and the King, successful and unsuccessful coups and civil war are major events that contributed to prolonged political instability that lasted until the end of the civil war in 1949 (see Appendix A1) and are largely responsible for the Greek states' weakness to build an efficient institutional framework that protects investors' rights.[6]

Besley and Persson (2009) emphasize on the ability of the state to provide an effective mechanism that protects property stating that its provision is not exogenously given but largely determined by the state's capacity. This ability is in turn shaped by social and political conditions. Governments which operate in an unstable political environment lack the incentive to undertake actions that protect property rights as they fully internalize the political cost of the reform but not the benefits (Svenssson 1998; Keefer and Knack 2002). Short horizons of governments make it more likely to prefer expropriation over growth and weaken political incentives to promote growth enhancing economic policies.[7,8]

[6] Sources of political instability might be ideological, political, social, economic, ethno-linguistic or religious. They manifest themselves when groups of organized people face financial hardship or do not find representation within the existing institutional setting.

[7] Under political unrest, the protection of property rights lacks intertemporal reliability and distorts incentives to engage in long term productive investments (Fielding 2003). On the contrary, in periods of political stability, the risk is lower and firms face an undisturbed time-horizon that allows them to undertake costly investments. Collier (1999) argues that political instability and the threat of civil war affect the composition of physical capital formation and lower investment in non-traded capital goods. As physical capital formation is partly irreversible, rational behavior calls for withholding investment until much of the uncertainty disappears. Political stability also impacts on growth through the channel of trade as it enables an asset's mobility. It also increases financial transactions by raising the possibility of using an asset as collateral.

[8] Formal links between political instability and economic outcomes can be found in Svensson (1998) and Devereux and Wen (1998).

On the other hand, Greece's poor economic performance during the 19th and the first half of the 20th century (with an average GDP per capita growth rate equal to 0.57% during 1833-1949) could have contributed to prolonged instability. A robust finding of the literature is that poor countries are disproportionately more likely to be involved in civil war, even though the direction of causation is difficult to establish (Elbadawi and Sambanis 2002). There are two leading explanations for this in the literature. Fearon and Laitin (2003) see it as reflecting limited state capacity to put down rebellions, while Collier and Hoeffler (2004) see it as reflecting the lower opportunity cost of engaging in political violence in low-income economies. Empirically, Miguel et al. (2004) showed that lower growth raises the probability of civil conflict in African countries from the 1980s onward. Overall, poor economic performance, political instability and weak enforcement of property rights were all symptoms of a fragile Greek state that lasted until the mid of the 20th century. As Besley and Persson (2011a) argue, politically unstable countries are unable to effectively provide high quality public goods that facilitate growth but at the same time, low income countries and ineffective states are more likely to incubate incidents of political violence.

Only after WWW II and the subsequent civil war, Greece's economy finally entered the stage of rapid industrialization. Its production structure changed drastically with the decisive decline of the agricultural sector (Petmezas 2006) approaching that of the rest developed European economies. The value added of the manufacturing sector rose by more than four times and its contribution to GDP increased from 25% in 1961 to 33% in 1973. GDP was growing at an average annual

rate of 6.9% (during 1953-1973) and within 20 years national income had increased by more than four times. The engines of growth were the rapid industrialization of the Greek economy and the rise of private and public investments that were growing by 9.8% per year.

Alogoskoufis et al. (1995) argue that after the end of the civil war in 1949 the political regime was characterized by commitment and coordination mechanisms that led to high investment rates and growth by guaranteeing property rights in the constitution and the law. The institutional framework that was adopted by 1953 provided strong incentives for undertaking private investment playing an extremely important role in the development of the industrial sector. This period is characterized by low political instability which helped to establish a climate of business trust. During the 1960s, the first steps were taken towards the integration of Greece in European economic institutions which helped to strengthen a sense of confidence for the Greek economy. Partial liberalization of the economy and integration to the globalized economic system finally led Greece to a middle-high income status. Importantly, access to schooling was generalized, higher education was expanded and for the first in the Greek history there was a transfer of resources from the production sector to the formation of human capital.

However, this era is not completely free of episodes of political upheaval. The period 1965-66 is characterized by prolonged political instability which had been triggered by a major disagreement between the prime minister and the king of Greece. During July of 1965 large mass demonstrations took place in the center of Athens against monarch. This period of political instability weakened the ability of the Greek

political system to govern the country and finally led to the imposition of a seven-year military dictatorship during 1967-1974. The period from 1974 onwards is characterized by the complete and uninterrupted restoration of democracy and political rights. At the same time, however, a period of political violence started with the advent of the terrorist organization of '17th November'. Its actions included bombings and politically motivated assassinations that caused death of Greek and foreign politicians, diplomats, military, police officers, businessmen and citizens. Soon after the outbreak of the global economic crisis, during December of 2008, large mass demonstrations burst in the center of Athens after killing of a 15-year old student by an armed police officer. Shortly after, a prolonged period of mass demonstrations took place during 2010-12 against inclusion of the country to the economic adjustment programmes and supervision by the Troika (International Monetary Fund, European Commission, European Central Bank).

Transition of Greece to the industrial epoch increased the importance of political instability as a facilitator of uninterrupted provision of property rights. There are good reasons to believe that property rights are not taken for granted, evolve over time and are endogenously determined by the level of economic development. Actions to secure property rights usually follow concerns about insecurity of the assets which are stronger when their value rises as the economy grows. As North and Thomas (1973) argue, changes in technology or demand lead to a rise in the value of assets and become key drivers of the emergence of private property rights. Increased security of property rights in turn facilitates investment and growth.

On the other hand, when growth is rapid, political violence is less likely to take place as it is not in the interest of anyone to engage in political violence. In this case, the opportunity cost to engage in political violence diminishes. Political stability in Greece after the civil war of 1946-49 and higher income were factors that contributed in building state capacity. State competencies that are acquired by the state during the development process include, among others, the power to enforce contracts and support markets through effective regulation (Besley and Persson 2010). Against the eventful background of Greece's economic and political history this study will try to explore the nature of the relationship between political instability and economic growth by using a dataset that expands over the period 1833 -2016 under an econometric framework that takes account of their two-way relationship.

3 Econometric specification and data

3.1 Index of political instability

Political instability can take place through formal or informal channels. The latter include incidents of political unrest like revolutions, assassinations, and armed violence while the former is related to instability of the political regime itself and includes events such as government terminations or electoral surprises (Campos and Karanasos 2008). In other words, formal political instability could be the result of the competition between different political institutions while informal political instability has no appropriate representation within such channels. The proposed index of political instability for Greece conceptually relates to both phenomena of regime instability and political violence. This definition is close to the idea of political instability that involves

substantial changes in the protection of property rights, retreat of the rule of law and violent reversion of the existing economic legislation that could cause a long lasting influence on economic growth.

I follow Campos and Karanasos (2008) and Campos et al. (2012) to use a range of variables that are divided in two categories of informal and formal political instability and distinguish whether instability originates *from* or *outside* the political system. The formal political instability series relies on the regime durability index of the Polity IV dataset. This indicator spans over the period between 1833 and 2016 and counts the number of years since the last substantive change in authority characteristics took place (see the Polity IV Project, Marshall et al. 2018). The indicator of formal instability is created as the inverse of regime durability and takes values between 0 and 1. The higher the value of this index the higher is the extent of formal political instability.

Regarding informal political instability, I rely on the economic history literature of Greece as my guide to identify events of political violence that took place from 1833 onwards.[9] On the basis of the availability of data over this period, I aim to use as many events as possible that proxy for violence-related political instability. My choice of incidents is conceptually based on the definition of Besley and Persson (2011b) which distinguish between one sided and two sided political violence. The former definition usually refers to violence exerted either by the government or a political group and includes events like coups or assassinations. The former is related to armed conflict

[9] Another possibility to model the effect of political instability would be to use the conflict events of the Cross National Time Series Archive of Banks and Wilson. However the period of its coverage is limited from the early 20th century onwards.

between the government and an opposing political group and usually manifests itself in guerrilla warfare or civil war.

Relying on the history of modern Greece (Koliopoulos and Veremis 2009), I first distinguish all incidents that are related to anti-government demonstrations. During this whole period large anti-government demonstrations took place in 1843, 1944, 1965-66, 2008 and 2010-12. I also include revolutions which could potentially lead to illegal or forced changes in the top governmental elite. I identify such events in the years of 1862 and 1951. Second, I define civil war as armed activity between the government and organized political groups aimed at the overthrow of the present regime. Such incidents took place in 1916 and 1946-49. The third measure of political violence relates to the incidence of a successful (or unsuccessful) military coup. During the examined period a number of coups took place in 1909, 1922, 1923, 1925, 1926, 1933, 1935, 1938, 1967 and 1973. At a later stage I will also consider the incidence of politically motivated assassinations. As it is difficult to precisely identify them within a long time period or distinguish which of these could be of major importance, this measure will be considered only for robustness purposes. I identify three cases of politically motivated murder or attempted murder of high government officials or politicians which took place in 1905, 1913 and 1920. Other incidents such as general strikes, riots or events of local importance (for instance a prolonged period of political violence took place in the region Thessaly after unequal distribution of land in the end of 19th century) are not included because their precise identification is not possible over such long period.

Appendix A1 enumerates in detail all specific items of political violence that I include in the index of instability. Table 2 summarizes all identified incidents along with current, previous and next year's GDP growth rates. Most events were accompanied by a subsequent fall in the rate of GDP per capita growth, compared to previous or current period's economic growth. [10]

After identifying all events of political violence, I create three dummy variables of informal political instability which receive ones for the years during which incidents of a) successful or unsuccessful coups d'état, b) mass demonstrations-revolutions, c) and c) civil war took place. However, the severity of the identified events is not the same as some of which, like the civil war, led to a large death toll, while some others were less serious (e.g. some unsuccessful coup attempts). To circumvent these concerns I conduct principal component analysis to classify the variables of regime instability and political violence into components and hence check whether this kind of latent analysis confirms the dominant blocks of political instability. Their first principal component is the final composite indicator of political instability. It has an eigenvalue of 1.311 and relates positively to regime instability and incidents of coups and civil war. Its evolution across time is shown in the Appendix Figure A1.

3.2 Initial model and explanatory variables

To search for the effect of political instability on growth, I use a time series dataset that extends over the period 1833-2016. I first provide a short discussion of

[10] We observe that during the period of the civil war (1946-1949) and especially during 1946-47, Greece witnessed remarkable growth rates. This can be explained by convergence dynamics, as the economy started to grow from a low income level after a five year- period of significant income losses (average GDP growth was equal to -17.2% during the period of WWW II, 1940-45).

the single equation approach. Though its major drawback is that it does not take into consideration the reverse association between growth and instability, I use it primarily to facilitate comparison with the simultaneous equation methodology which is later employed to address the issue of endogeneity bias. The following growth specification is considered:

$$Y_t = a + \beta INS_{t-1} + \gamma X_{t-1} + \delta D_{t-1} + u_t \quad (1)$$

with *Y* being the growth rate of output per capita and *X* a vector of regressors lagged by one period. Data for the variable of real GDP per capita growth are provided from the Maddison Project Database and are expressed in 2011 international dollars.[11]

INS is a variable associated with political instability. A drawback of using a single indicator of political instability is that it is difficult to interpret its influence unambiguously given that other events take place within the same period that could exert an independent impact on economic performance.[12] Therefore, I consider vector *D* comprising of dummy variables associated with other major events against which the impact of political instability is gauged. These events are war, economic crisis and dictatorship. The first distinguishes all years during which Greece was involved in a war. The second is associated with economic instability and receives one for all years during which the Greek public debt was in default or under restructuring (Reinhart and

[11] The Maddison Project Database is amongst the most widely used sources of historical income data providing information on real GDP growth over the very long run. Pre-1950 real GDP data are usually based on benchmark estimates derived either from historical national accounts or from historical studies. For more details on the construction of the real GDP per capita series see Bolt et al. (2018).

[12] For example, even though the civil war is coded to begin in 1946 (see Appendix A1), during the German occupation (WWII period) there were major civil conflicts occurring in the occupied Greece. Also, for a large part of the 19th century the Greek debt was in default or under restructuring (see Reinhart and Rogoff 2011).

Rogoff 2011). Finally, I employ a dummy variable which receives ones for the periods during which Greece was ruled by a dictatorship.

I also consider government uncertainty which is related to regular government changes. In doing so, I create a dummy variable which dates all years during which parliamentary elections took place. Political uncertainty regarding re-election might be harmful for growth. In periods before the elections politicians engage in myopic behavior and are not interested in long term policies. Governments usually postpone unpopular decisions and avoid bearing the political cost. Examples of this kind of behavior are the delay of structural reforms or excess public spending.

My choice of variables included in vector X is guided by economic theory. I therefore include the once lagged variable of output per capita to control for convergence effects. As I estimate a time series econometric specification, I include a time trend in the regression and also consider the lagged growth rate of output per capita to account for persistence in the dependent variable. In the absence of any reported data on physical capital formation, I include in the specification a rather crude measure of bank savings (% GDP) to model the influence of private investment.[13] I also consider a regressor that accounts for the impact of growth spillovers that originate from dominant economic nations' economic performance (Great Britain during the 19th and U.S.A. in the 20th century). I also consider the influence of macroeconomic instability and public finances and include in my specification the

[13] The time coverage of this variable ranges between 1842 and 1939 and between 1960 and 2015. No observations are available for the period of war between 1940 and 1949 (WWWII and civil war). Bank deposits between 1950 and 1960 do not enter in this variable as observations of this period are not compatible with the rest of the time series. Observations for bank deposits between 1842 and 1939 are from Lazaretou (2014). From 1960 onwards I use the ratio of bank deposits to GDP (Worldbank 2017).

variables of inflation and public debt (% of GDP).[14] In the absence of any officially reported data on the educational level of the population, an obvious disadvantage of the econometric specification is the lack of any control variable related to the stock of human capital.

3.3 Identification

Poor economic performance could increase the probability of a major political event or a government change after increased public discontent. In modern democracies, such a change manifests itself through the election of a new government. However, in countries which are politically and institutionally underdeveloped, political instability may be manifested through violent events. Gupta (1990), Londregran and Poole (1990) and Alesina et al. (1996) argued that poor growth performance could be the source of political instability.

Equation (2) models political instability as a function of economic and political variables:

$$INS_t = a + \beta INS_{t-1} + \gamma ECON_{t-1} + \delta POL_{t-1} + \theta D_{t-1} + e_t \quad (2)$$

INS is a measure of political instability while ECON is a set of economic variables that determine political instability. I consider the influence of the level and the growth rate

[14] For the 1834-1938 period inflation is approximated by the growth rate of the GDP deflator which is based on a composite price index comprising of ten major products from agriculture, livestock, forestry and mining (Kostelenos et al. 2007). For the period from 1949 onwards this variable is the yearly change of the consumer price index. The consumer price index for the period 1949-1959 has been obtained from the Bank of Greece (1992). From 1960 onwards I use the yearly price change of the consumer price index of ELSTAT (2018). The debt to GDP variable is from IMF's (2015) historical debt to GDP database and is available for the period 1884-2015. Missing observations are from periods 1914-1927, 1940-1951, 1957, 1976-1978.

of GDP per capita. I also control for the effect of macroeconomic instability and include the variable of inflation.

I also include in the specification of Equation (2) the Polity IV index of democracy which measures the extent of political freedom in a country (Marshall et al. 2018). It contains information on the extent of democracy and ranges from strongly autocratic (-10) to strongly democratic (10). This variable is expected to exert an adverse influence on political instability. Democratic regimes tend to experience less instability than undemocratic regimes because they allow people to participate in the political process. By allowing participation, internal conflicts are resolved through the process of voting. In undemocratic regimes, social discontent does not find representation through the elections and therefore is more likely to take place through violent events. Alike, Besley and Persson (2011b) argue that civil war and repression are usually the product of weak political institutions. I also include vector *D* in the regression which encompasses four dummy variables associated with the incidence of war, dictatorship, default and elections.

If the residuals of equations (1) and (2) are not correlated, then OLS estimates will deliver consistent estimates. However, this assumption is rather unrealistic given that economic growth could be reversely associated with political instability. Disentangling this two-way relation requires a more sophisticated empirical strategy than the OLS. Alesina and Peroti (1996) argue that the estimation of a structural econometric specification is the modeling choice that should be followed in this case. Hence, I consider the following system of two equations:

$$Y = a_1 + \beta_1 X_1 + \gamma_1 X_{11} + \delta_1 INS + e_t \quad (3)$$

$$INS = a_2 + \beta X_2 + \gamma_2 X_{22} + \delta_2 Y + u_t \quad (4)$$

The dependent variable of equation (3) is the growth rate of output per capita *Y*. In equation (4) the dependent variable is political instability *INS*. X_{11} is a vector of variables that determine economic growth (Y). It includes lagged GDP per capita (in log) and lagged GDP per capita growth, political instability, the dummy variables of war, default, elections and dictatorship and the economic variables of inflation, debt (% of GDP) and deposits (% of GDP). X_{22} is a set of variables that determine political instability. It includes GDP per capita (in log) and GDP per capita growth, lagged political instability, inflation, the polity IV index of democracy and the dummy variables of war, default, elections and dictatorship

One important issue in estimating the above empirical model is the correct identification of the two equations. One or more of the regressors in one of the two equations must not enter as independent variable in the remaining equation. This means that at least one of the regressors in equation (3) affects only GDP per capita growth. Similarly, one of the regressors in equation (4) should affect only political instability. Vector X_1 includes the variable of growth spillovers as an exogenous covariate that affects only growth. Given that Great Britain and the USA were the dominant economic nations of the 19th and 20th century, respectively, I include in the specification a regressor that is equal to their growth rate of output per capita. However, as Greece was a protectorate of England for a significant part of the early 20th century and was heavily dependent on the U.S economic aid (under the initiative of the Marshall Plan) for some years after WWWII someone could argue that changes in the English or the U.S. economy might, equally, affect their foreign policy and,

hence, political instability in Greece. For this reason, the econometric specification considers a variable of growth spillovers that does not heavily rely either on the U.S. or the British economic growth and, therefore, is more likely to be exogenous to local political developments. This variable equals the growth rate of British output per capita for the period up to 1900. During 1900-1940, a period during which when both the USA and England were considered as leading economic nations, this variable equals the average of their growth rate of output per capita. From 1940 onwards this variable is equal to the growth rate of U.S output per capita.

VectorX_2 encompasses the polity IV index of democracy as an exogenous variable that identifies political instability. As argued previously, democratic regimes usually experience less instability than undemocratic regimes because they allow people to participate in the political process. However, someone could argue that this index is not exogenous to economic growth and therefore should be included in Equation (3). While a significant number of studies argue in favor of a weak or even ambiguous impact of democracy on growth (see among others Barro 1996; De Haan and Siermann 1996; Gerring et al. 2005), it could be that democratic political institutions affect growth through indirect channels (besides instability) such as education or economic freedom.

Recently, Acemoglu et al. (2019) showed that democratizations cause growth across a wide panel of countries but only in the long run. Persson and Tabellini (2009) argued that what matters for growth is the democratic capital of countries while Boese and Eberhardt (2021), relying on the idea that a democratic regime change is not a discrete event but a two-stage process, argue that its growth effect is apparent after

about 30 years. This could probably mean that what matters for growth is probably the strength of democracy. Transitions to democracy are not always successful and are usually accompanied with a period of large uncertainty (being associated with economic costs) regarding the strength and stability of political institutions.[15] In this case, it could take time for democratic regimes to stabilize themselves and implement growth enhancing reforms (see among others Alesina 1991; Fernandez 1991; Dewatripont and Roland 1995 for a literature that highlights the importance of time when introducing reforms under uncertainty). The history of Greece is full of failed attempts of democratization (in the first years after liberation from the Ottoman Empire and in 1924), dictatorships (1926-27, 1936-41, 1967-74) and unstable (although democratically elected) governments not allowing the uninterrupted establishment of democracy until the mid-1970s. Taking this into account, I choose to include as a specifying variable of growth in Equation 3 the length of democracy, defined as the number of consecutive years since a country has transitioned to a democratic regime (a country is defined as democratic in the Polity IV Project if its score lies between 5 and 10).

Coefficients δ_1 and δ_2 estimate the causal effect between growth and political instability. The estimation is carried out via the three-stage least squares econometric methodology to account for correlation in the disturbances of equations (3-4). Table 3 provides brief descriptive statistics of all variables that are used in the econometric analysis. It also provides frequencies of dummy variables that enter in the regressions. It bears noting that specific economic variables receive extreme values in certain

[15] The so-called Lipset (1959) hypothesis underlines that democracy is a good which is acquired when countries become sufficiently well-off.

historical periods.[16] For robustness purposes the empirical analysis that follows will consider regressions that skip outlier observations (Table 7). The correlation matrix of Table 4 illustrates that no significant problem of multicollinearity exists between political instability and other explanatory variables that enter as regressors in Equations 3-4. Figure A2 in the Appendix shows the time evolution of the variable of GDP per capita growth.

4 Econometric estimates

4.1 Initial estimates

Initial OLS econometric estimates of equation (1) are based on time series observations ranging from 1833 to 2016. Table 5 shows that the dependent variable of GDP per capita growth and the composite indicator of political instability are both stationary[17]. All estimates of Table 6 point to a negative and statistically significant impact of political instability on economic growth which ranges from -0.009 to -0.016. If taken as causal, then estimates of column 1 imply that a one standard deviation decrease of political instability would bring about a 1.37% increase in the rate of GDP per capita growth.

[16] For instance, the minimum value of GDP per capita growth was -51.36% in 1913 which was the second year of the Balkan wars. Its maximum value was 52.21% in 1918 which coincides with the end of the WWW I. Similarly, the lowest value of the inflation rate (-99.88%) was observed in 1954, one year after the drastic devaluation of the national currency, while its maximum value (72.57%) was observed in 1923, when Greece received in its territory more than one million refugees from Asia Minor. The debt to GDP variable came close or even exceeded 200% in the decade after the default of 1893.

[17] Dickey-Fuller unit root tests of Table 5 indicate that the variable of GDP per capita is non-stationary in its logarithmic level, as its associated test is lower than the 5% critical value. When considering the first difference of GDP per capita, the null hypothesis of non-stationarity is rejected suggesting that it becomes stationary when taking its first difference.

Concerning the rest of covariates included in Table 6, lagged GDP per capita enters the regression with a significantly negative coefficient estimate confirming that Greece has followed a process of economic convergence. The coefficient of the time trend variable is significantly positive, suggesting that Greece's economic performance improves over time. Likewise, growth spillovers, as approximated by the dominant nations' growth rate of GDP per capita, exert a favorable impact on growth of the Greek economy. Durbin Watson values are close to 2 across all reported regressions ensuring that the residuals are not autocorrelated.

In Table 7 I report some additional robustness checks. First, I re-estimate equation (1) by skipping outlier observations with a standardized residual higher (lower) than ±1.96 (column 1). I also check the sensitivity of estimates to the set of covariates included in the analysis. Including a fairly large set of explanatory variables limits degrees of freedom whereas coefficients could be unstable in the presence of co-linearity. For this reason, I choose to exclude from the analysis some controls which could be side effects of political instability, such as the occurrence of war, economic crisis and elections (column 2). Results of columns 1-2 illustrate that the impact of political instability remains strongly negative. Finally, to assess if the dynamic specification can affect the interpretation of the results, I transform equation (1) to an error correction model. As can be seen by the results of column 3 the qualitative and quantitative effect of political instability is essentially the same to those obtained by the rest estimates. The error correction term is negative and close to -1 indicating that any short run disequilibrium is fully dissipated by the next time period. When regressing output per capita growth on individual components of political instability,

OLS estimates of Table 8 confirm that all incidents of political violence (civil war, coups, revolutions-mass demonstrations) are adversely associated with growth.

4.2 Simultaneous equation estimates

To identify the causal effect of political instability on economic growth, I proceed with the estimation of a structural econometric model that disentangles their possible endogenous association. Table 9 provides generalized least squares estimates of the system of equations 3 and 4. The dependent variable of equation 3 is the growth rate of GDP per capita with political instability entering as an explanatory covariate. In Equation 4, the composite index of political instability is the dependent variable with the growth rate of GDP per capita entering as a regressor. As identifying variable in equation 3 I consider a measure of growth spillovers emanating from dominant nations' economic growth. Likewise, the polity index of democracy is the identifying variable in equation 4.

Estimates of Table 9 confirm that political instability exerts a significantly negative effect on growth. Its estimated influence is higher in magnitude compared to initial OLS estimates. Similarly, estimates of the bottom part of Table 9 demonstrate that poor growth performance increases the probability of political instability. Estimates of column 2 include the growth influence of private deposits. In column3, I consider the growth effect of territorial expansions that were accompanied by large population spikes in 1881, 1913 and 1922. In doing so, I create a dummy variable that receives ones during these years. This variable enters as a regressor also in the political instability equation as population increases could affect social unrest through changes

in the ethnic composition. In column 4, I consider a restricted set of controls that does not include the influence of the dummy variables of war, elections and default. All estimates point to a negative effect of political instability on GDP per capita growth and illustrate that economic prosperity lowers the likelihood of political instability.

Next, I check the sensitivity of estimates by skipping outlier observations with a standardized residual higher (lower) than ±1.96. Results of column 5 confirm the mutually negative inter-relationship between instability and economic growth. In columns 6-7, I check the robustness of estimates to changes in the identification assumptions of Equation 3. I re-estimate equations 3-4 by assuming that the growth rate of England (column 6) or USA (column 7) was determining economic growth of Greece over the whole period under examination. Econometric estimates do not change drastically even when using the U.S or British economic growth as instruments of growth in Equation 3. Column 8 considers a broader definition of political instability that includes the assassinations of major political officials. I identify three major incidents: the assassination of the prime minister Diligiannis in 1905, the killing of King George A' in 1913 and the attempt against the ex-prime minister Venizelos in 1920. Finally, given that political unrest could be determined not only by the extent but also by the strength of democracy I consider in column 9 the length of democracy as a regressor of political instability. Regression results (of columns 8-9) verify the strongly negative causal inter-relationship between growth and political instability.

4.3 Structural breaks and the role of the stage of development

Given the long time period under investigation, the effect of political instability on growth could drastically change at a point in time. A Wald test based on the regression of GDP per capita growth on a time trend shows that in the year of 1955 a structural break took place (Table 10). Also, Figure 1 illustrates a CUSUSM parameter stability test based on the squared recursive residuals of the growth regression of Table 9. Parameter instability is statistically established when the weighted cumulative recursive residuals stray outside their confidence intervals. This is exactly what Figure 1 illustrates for a sub-period that starts in the middle of the sample.

Therefore, I proceed with the estimation of equations (3-4) across two different sub-periods. I use 1955 as my threshold point and perform regressions before and after this year. Estimates of Table 11 suggest that the nature of the relationship between political instability and growth is not uniform over time. As illustrated by estimates of column 1 political instability did not exert any significant influence on growth in the period before 1955. By contrast, in the post-1955 period, political stability emerges as a key factor in boosting economic growth. We also confirm that GDP per capita growth caused a negative effect on political instability only in the post-1955 period.

One possible explanation for the uneven effect of political instability relates to the multiple stages of development that the Greek economy has gone through the last 200 years. Throughout the whole 19th and during the first half of the 20th century, Greece was characterized by the undercapitalized structure of its production. If political instability matters more for countries which are capital intensive, then we

should expect that rural-labor intensive economies should be less vulnerable by incidents of political disorder. Likewise, the period after the first half of the 20th century coincides with the rapid take-off and industrialization of the Greek economy. A successful transition of the Greek economy to a high growth regime required an environment free of political risks that would ensure the uninterrupted undertaking of private investments.

I test this possibility by performing regressions at different stages of economic development as measured by a) the economic gap of Greece vis-à-vis each period's dominant economic nation (Great Britain or USA) and b) by the percent of population living in rural areas. The economic gap is measured by the distance (relative ratio) of GDP per capita between Greece and the country with the highest GDP per capita (Great Britain or USA). As regards the percent of rural population, I use yearly estimates of the share of population living in areas with population lower than 2.000 (Dertilis 1993). These observations range from 1833 to 1933. I preferred to use this measure since population statistics are available on a yearly basis already from 1828 (while occupational statistics are not) allowing us to avoid extrapolation back to 1833. This series is complemented with official census statistics of the percent of rural population that is available on a ten-year basis from 1920 onwards (ELSTAT 2020). Missing observations have been recovered with the use of interpolation techniques. Table 12 shows the evolution of the development stage of the Greek economy as measured by its economic gap vis-a-vis the most developed country and by the share of its rural population.

Estimates of Table 13 report the effect of political instability conditional on the share of population living in rural areas (columns 1-2). Regressions are performed across the highest/lowest half of its distribution with the strongest effect of political instability observed across quartiles with the lowest share of rural population. Likewise, estimates of columns 3-4 illustrate that the most harmful effect takes places at the quartiles with the lowest economic distance vis-à-vis the most developed country fitting our theoretical priors that the effect of political instability is stronger at late stages of economic development. Estimates of the bottom panel highlight that economic growth lowers the likelihood of instability only at late stages of economic development.

4.4 The effect of political instability in high income European countries

Estimates of Table 13 are informative for the presence of a non-linear relationship between political instability and growth which is conditional on the stage of economic development. To validate the causal nature of the effect of political instability on growth and add generality on its conditional influence on the level of economic development, I follow a counterfactual approach to compare its effects within a sample of twelve European countries (Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Sweden, Switzerland and UK). I use the table of revolutionary events of Aidt and Jensen (2014) and consider the revolutions of 1848 as an exogenous event that could have an impact on economic growth. Aidt and Jensen (2014) identify Austria, France, Germany and Italy as the countries that were heavily influenced by the revolutions of that time. I therefore use them as my treatment group

to see if the effect of revolutions was more severe against that of the remaining eight countries that form the control group.

I ask the following two questions: (i) what would be the rate of economic growth of European countries had they not been affected by the revolutionary events of 1848? and (ii) was GDP per capita growth more influenced in countries that were wealthier? My sample extends over the period 1838-1859. I compare growth performance between treated and control countries before and after 1848 with the following difference in differences specification:

$$growth_{it} = a_0 + \theta Q_{it} + \gamma\, I(t > s) + \delta Q_{it} * I(t > s) + \beta X + d_t + \varepsilon_{it} \quad (5)$$

growth is the outcome variable of GDP per capita growth, while *i* indexes countries at time t. Q_{it} is a dummy variable receiving ones for countries that were influenced from the revolutions of 1848 (Austria, France, Germany and Italy) and zero otherwise, $I(t > s)$ is an indicator function equal to one for the post-1848 period (1848-1859) and $Q_{it} * I(t > s)$ is an interaction term between Q_{it} and $I(t > s)$. The parameter δ represents the effect of revolutionary events on growth which is estimated by the difference in differences estimator. Vector *X* includes as explanatory covariates those of the logarithm of GDP per capita (log), population growth (both obtained from the Maddison Project Database), the polity IV index of democracy and the inflation rate (Reinhart and Rogoff 2011). Finally, ε_{it} is an error term.

Difference in differences comparisons of economic growth are presented in Table 14, along with the associated standard errors. The upper panel shows that the average growth difference between control and treated countries was statistically insignificant before the revolutions of 1848 (column 1). The lower panel illustrates that

growth differences in the post-revolutionary period were negative and statistically significant indicating that economic performance of countries that were affected by revolutions witnessed a significant drop. The overall effect of revolutions on growth is estimated by the difference in differences estimate which is significantly negative suggesting that economic growth would have been higher had European countries not been affected by the revolutionary events of 1848. Relying on estimates of column 1, GDP per capita growth would have been higher by 7.9% in the absence of revolutions. Difference in differences estimates of column 2 remain practically unchanged when considering in the regression two additional dummy variables that indicate the occurrence of a war (Aidt and Jensen 2014) or the event of a severe economic crisis (Reinhart and Rogoff 2011).

To reduce the risk of selection bias, I use propensity score matching on a number of economic, social and political characteristics that are likely to predict the occurrence of a revolution. For instance, it could be that some European countries did not face a revolutionary outbreak because they experienced democratic reforms in the shadow of conflict. The goal is to approximate randomization of treatment by estimating the probability of the revolutions of 1848 given a vector of structural factors that could determine their occurrence. I use as predicting variables GDP per capita (log), inflation, population growth and democracy. Difference in differences comparisons between treated and control countries remain negative but lose in terms of statistical significance (column 3).

To see if the growth influence of revolutions was conditional on the level of economic development, I compare the economic performance of the most rich

countries that were affected by revolutions against that of the rest ones. According to the Historical Statistics of the World Economy, GDP per capita in 1820 was higher in Austria and France (compared to that of Germany and Italy) and therefore these two countries form my second treatment group that is used to investigate if the stage of economic development matters for the growth influence of political instability. Regressions of columns 4-6 are performed in the same way as those reported in columns 1-3 with Austria and France forming the treatment group and the rest composing the control group. Difference in differences estimates of columns 4-6 show that after the revolutions of 1848 economic growth of treated countries was lower compared to that of control countries suggesting that economic activity of the richest countries was more severely hit by revolutionary events. For robustness purposes, in columns 7-9, I consider as my treatment group the group of countries that were already industrialized and had been seriously affected by the revolutions of 1848. These countries were France and Germany.[18] My control group consists of the rest ten countries. Again, difference in differences estimates of columns 7-9 confirm that industrialized countries of that time were those that were most severely hit by political instability.

4.5 Permanent and temporary effects

One of the goals of this study is to see if the effects of political instability on growth are temporary or last over the long run. The productivity impact of investments in physical capital and technology equipment takes time to materialize and therefore potential

[18] According to economic history of Europe, the countries of Europe that had rapidly industrialized by the late 19th century were Great Britain, Germany, Belgium, Netherlands and France.

output and aggregate supply should be adversely influenced in politically unstable countries that cannot effectively protect property rights. Likewise, cyclical output could be heavily influenced by precautionary saving, lower current consumption and a possible downturn in trade and exports in unstable countries. To distinguish between temporary effects on output fluctuations and permanent influences on potential GDP, we must first isolate the cyclical component from the estimated trend of GDP per capita. The economics' literature proposes a variety of methods to separate long-term trends from cyclical fluctuations. I use the Hodrick-Prescott (HP) filter to detrend the GDP per capita series with a smoothing parameter λ=100 for annual data. The HP filter is not without criticism; however, its simple estimation and implementation makes it still widely acceptable in the business cycle literature. The estimated trend can be interpreted as the potential output and the cyclical component as the output gap.

Table 15 reports coefficient estimates of political instability with trend GDP per capita growth (column 1) and output gap (column 2) entering as dependent variables. Regression results confirm that political instability affects growth of potential output in an unfavorable way. Similarly, the likelihood of political instability lowers as the growth rate of trend GDP per capita increases. Estimates of column 2 are in favor of a negative but statistically insignificant effect of instability on the cyclical component of GDP. Output fluctuations do not exert any significant influence on the likelihood of political instability. Estimates of Table 15 are partially in line with Campos et al. (2012) showing that political instability (as measured by politically motivated assassinations, guerilla warfare and strikes) exerted a negative long run and short run effect on growth of Argentina during 1896-2000.

5 Concluding remarks

The purpose of this study was to examine the relationship between economic growth and political instability. Unlike the existing literature providing so far evidence based on cross country data, I studied their association within the historical context of Greece's modern political life. The period after its liberation from the Ottoman Empire is rich in episodes of political violence and therefore their study could be useful in trying to explain the impact of political instability on economic performance of a single country.

I followed the narrative approach to identify all major events of political violence that took place from 1833 onwards. Then I combined them with an index of regime vulnerability to create a composite time series indicator of political instability. Compared to previous findings, this paper provides evidence in favor of a negative impact of political instability on economic growth. Likewise, poor growth performance raises the likelihood of political instability. Their relationship is not uniform across time. A significantly negative interrelationship emerges only in the phase of rapid industrialization, during the second half of the 20th century, suggesting that the growth influence of political instability is determined by the stage of economic development. This study also shows that political instability mainly impacts on the growth rate of potential output. Likewise, higher potential GDP growth exerts a strongly negative effect on the likelihood of political instability. The estimates of this study are consistent with theoretical predictions that, political stability and economic development jointly emerge as countries become economically well-off. This study's

results are also consistent with arguments that poor countries first emerge from poverty and only subsequently improve their institutions (Glaeser et al. 2004).

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Appendix

Appendix A1: Incidents of political violence in Greece's modern history

1843: Insurgency against the first king of Greece Otto in 1843 which led to the grant of the first constitution. In the same year, the first default after the establishment of the Greek state took place which led to the imposition of fiscal control.

1862: Eviction of the first King Otto after military uprising which led to his replacement by King George A' in 1864.

1905: Assassination of prime minister Theodeore Diligiannis

1909: Military coup against the government which resulted in the advent of the new Prime Minister Eleftherios Venizelos.

1913: Killing of King George A'

1916: Major disagreement between the Prime Minister Eleftherios Venizelos and King Constantine I over the military involvement of Greece in the WWW I led to a significant conflict and a national schism. In 1916 with the support of the French army, Venizelos set up a provisional government in Thessaloniki against the royalist government in Athens. There was also an armed confrontation in the streets of Athens between the royal army and the French forces. A naval blockade by the allies of Entante finally forced King Constantine I to leave Athens (without abdication) in 1917 and leave his son Alexander as King of Greece. Greece entered the war by the side of the Entrant allies in 1917-18.

1920: Murder attempt against ex-prime minister and leader of the liberal party Eleftherios Venizelos

1922: In reward for the military support during WWW I the allies offered Greece the territories of Western and Eastern Thrace with the Treaty of Sevres in 1920. The Greek army also landed in the territory of western Asia Minor with the objective to annex it to Greece after a referendum. However, King Constantine and the royal friendly government of that period which took office after the elections of 1920 attempted to invade in the inside of the ex-Ottoman Empire resulting finally in a major military defeat and a pogrom against the Greek population in 1922. After the catastrophe a military coup which was organized by antiroyalist army officers took place and forced King Constantine I to abdicate.

1923-1938: During this period a number of successful or unsuccessful military coups took place being the result of the political dispute between the liberal and the royalist party. I report the following: 1923: unsuccessful military coup against the government, 1925: successful military coup which led to the dictatorship by General Pagkalos lasting until 1926, 1926: Military coup against the dictator Pagkalos which led to his overthrow, 1933: unsuccessful military coup against the government, 1935: unsuccessful military coup against the government, 1936: Imposition of dictatorship under General Ioannis Metaxas, 1938: unsuccessful military coup against the government.

1944: Soon after liberation by the German troops, mass demonstrations of the communist party took place against the coalition government and the British forces leading to an armed conflict in the area of Athens in December of 1944. Political polarization of that period and mass persecutions of the communists led to the civil

war of 1946-49 after the decision of the communist party to abstain from the first post WWWII national elections in1946 and the return of King George.

1951: Military rebellion of a group of higher military officers in favor of the General of the Army Alexandros Papagos.

1965-66: Prolonged political instability after major disagreement of the prime minister with the king of Greece. During July of 1965 large mass demonstrations took place in the center of Athens against monarch. This period of political instability weakened the ability of the Greek political system to govern the country and finally led to the imposition of dictatorship after a military coup in 1967.

1967: Successful military coup after a period of political turmoil (1965-1967) which led to the dictatorship of 1967-1974.

1973: Military coup after the student uprisings of November 1973.

2008: Large mass demonstrations during December of 2008 in the center of Athens after killing of a 15-year old student by a police officer.

2010-12: Prolonged period of mass demonstrations against inclusion of the country to the economic adjustment programmes and supervision by the Troika (International Monetary Fund, European Commission, European Central Bank).

Appendix A2

Figure A1: Composite index of political instability (1833-2016)

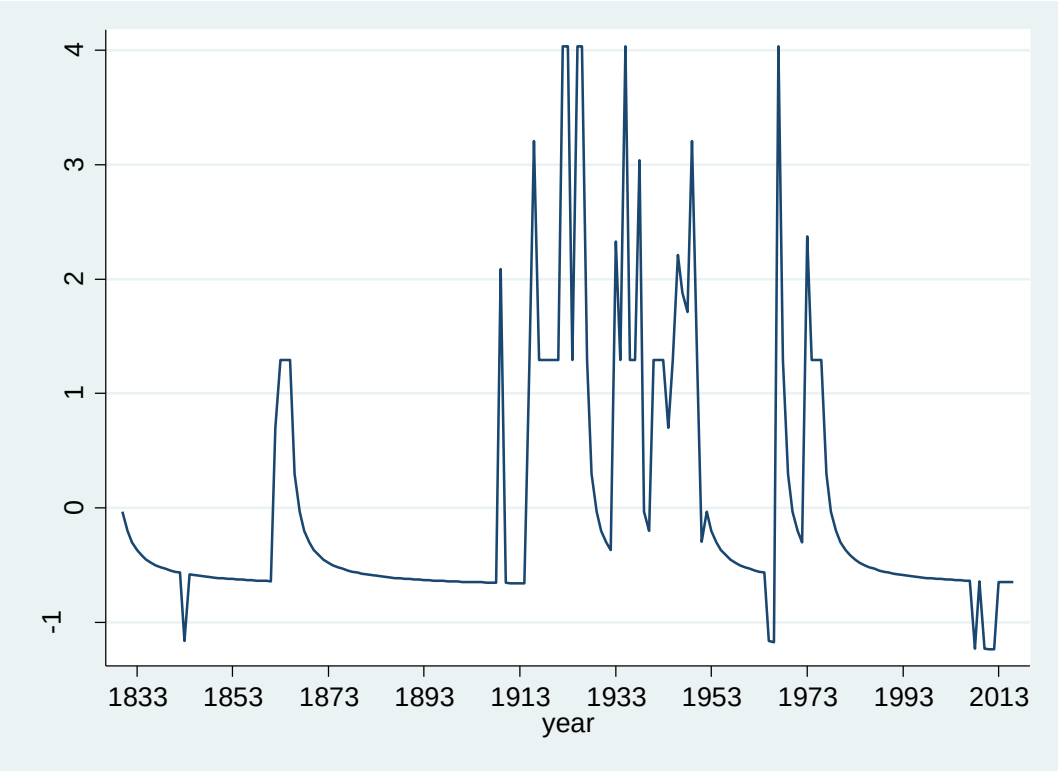
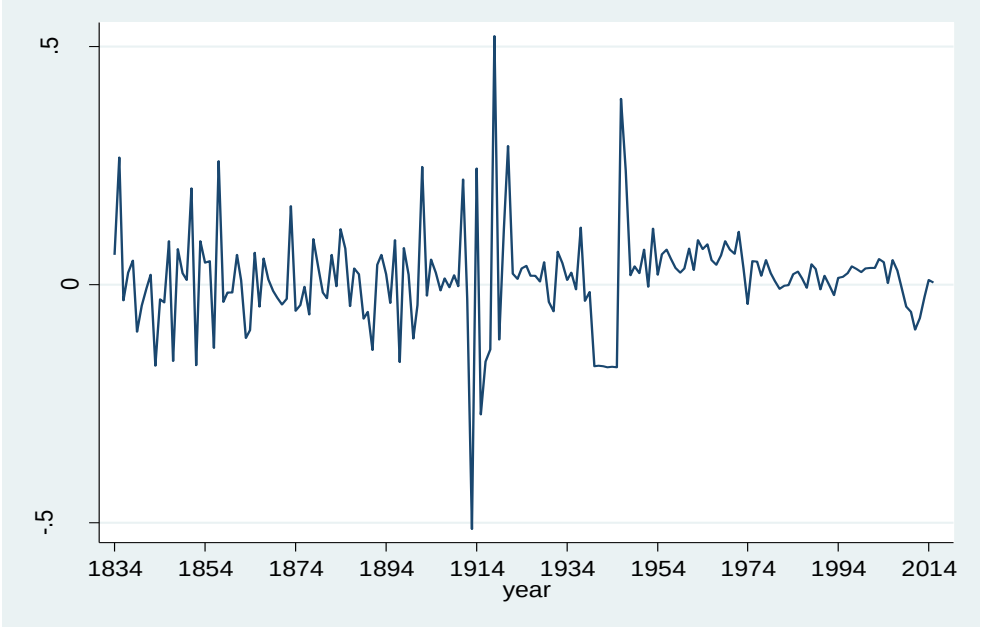


Figure A2: GDP per capita growth (%, 1834-2016)



Tables & Figures

Table 1: Brief review of the empirical literature

Study	Finding	Sample
Stewart and Venieris (1985)	Sociopolitical instability impacts on growth through the channel of lower savings.	60 less developed countries during 1961-67
Venieris and Gupta (1986)	Negative impact of unequal income distribution and sociopolitical instability on savings.	49 non-communist countries at various years
Londregran and Poole (1990)	The likelihood of a government collapse increases with lower economic prosperity. No evidence in favor of a negative impact of coups on income growth.	121 countries during 1950-82
Ozler and Rodrik (1992)	The extent of political stability can magnify or dampen the influence of an external shock on private investment.	32 countries during 1975-85
Fosu (1992)	Political unrest is associated with inferior economic performance.	38 Sub-Saharan countries during 1975-90
Alesina et al. (1996)	Increased probability of government collapse impacts negatively on economic growth. Low economic performance increases the propensity of government change.	113 countries for the period 1950 through 1982
Alesina and Perotti (1996)	Income inequality increases the likelihood of sociopolitical instability which impacts negatively on investment.	71 developed and developing countries during 1960–85
Chen and Feng (1996)	Regime instability, polarization and government repression exert a negative impact on growth.	88 countries over the period 1974–90
Ades and Chua (1997)	Political instability of neighboring countries lowers economic growth through decreased trade flows and higher military spending.	118 countries over the period 1960-85
Gyimah-Brempong and Camacho (1998)	Political unrest exerts an adverse effect on growth through lower human capital accumulation.	18 Latin American countries over the period 1970-81
Asteriou and Siriopoulos (2000)	Socio-political instability as measured by a composite index comprised of politically motivated assassinations, terrorist activities, strikes, elections and the extent of democracy affects negatively stock market performance and economic growth.	Greece during 1960-95
Asteriou and Price (2001)	Political instability as measured by an index comprised of terrorist activities, strikes, elections, government changes and the occurrence of a war exerts a	United Kingdom during 1961-97

	negative effect on economic growth and a positive impact on growth uncertainty.	
Campos and Nugent (2002)	Absence of causal effect of political instability on growth except for the group of African countries.	98 developing countries during 1960-1995
Jong-A-Pin (2009)	Out of 25 different indicators, only the instability of the political regime exerts a robustly negative effect on growth.	90 countries over the period 1974–2003
Campos et al. (2012)	Informal political instability (politically motivated assassinations, guerilla warfare, strikes) exerts a negative long run and short run effect on growth. Formal instability (cabinet or constitutional changes) exerts an indirect adverse impact on growth through higher volatility.	Argentina during 1896-2000
Aisen and Veiga (2013)	Total factor productivity is the main channel through which political unrest impacts on growth.	169 countries during 1960-2004
Uddin et al. (2017)	Political instability negatively affects economic growth of low- and middle-income countries.	120 developing countries over the period of 1996–2014
Campos et al. (2020)	Informal political instability affects growth in a negative way	Brazil during 1870-2003

Table 2: Incidents of political instability and growth rates of GDP per capita

Year	Event	Previous year's growth rate of GDP per capita	Current year's growth rate of GDP per capita	Next year's growth rate of GDP per capita
1843	Insurgency against King Otto	2.13%	-17.02%	-3.11%
1862	Eviction of King Otto after military uprising	6.23%	0.91%	-11.25%
1909	Military coup against the government (successful)	-0.51%	1.93%	-0.38%
1916	Major conflict between prime minister and the king	-27.32%	-16.20%	-13.61%
1922	Military coup against the government (successful)	29.18%	2.33%	1.24%
1923	Military coup against the government (unsuccessful)	2.33%	1.24%	3.42%
1925	Military coup against the government (successful)	3.41%	3.94%	1.85%
1926	Military coup against the government (successful)	3.94%	1.85%	1.84%
1933	Military coup against the government (unsuccessful)	6.98%	4.53%	0.97%
1935	Military coup against the government (unsuccessful)	0.97%	2.53%	-1.01%
1938	Military coup against the government (unsuccessful)	1.20%	-3.38%	-1.49%
1944	Mass demonstrations in the city of Athens and military conflict between the communists and the coalition government	-17.39%	-17.32%	-17.41%
1946	Civil war	-17.41%	39.10%	24.02%
1947	Civil war	39.10%	24.02%	2.01%
1948	Civil war	24.02%	2.01%	3.83%
1949	Civil war	2.01%	3.83%	2.45%
1951	Military rebellion of a group of higher military officers	2.44%	7.38%	-0.40%
1965-1966	Prolonged period of political instability after major disagreement of the prime minister with the king of Greece accompanied with large mass demonstrations against monarch. This period of political instability weakened the Greek political system and finally led to the imposition of dictatorship after a military coup in 1967	7.53%	6.84%	4.15%
1967	Military coup (successful) and imposition of dictatorship	5.18%	4.16%	6.17%
1973	Military coup after the student uprisings of November 1973	1.10%	3.39%	-4.08%
2008	Mass demonstrations in the city of Athens in December of 2008 after killing of a 15-yar old student by a police officer	2.96%	-0.60%	-4.66%
2010-2012	Prolonged period of mass demonstrations against inclusion of the country to economic adjustment programmes and supervision by the Troika (International Monetary Fund, European Commission, European Central Bank)	-4.66%	-7.41%	-2.56%

Table 3: Summary statistics and frequencies of variables

Variable	Obs.	Mean	Standard Deviation	Min	Max
GDP per capita growth (%)	183	1.365	10.558	-51.365	52.216
GDP per capita (log)	184	8.516	0.890	7.400	10.300
Political instability	187	0.000	1.145	-1.235	4.033
Debt (% of GDP)	103	91.155	59.942	9.690	223.500
Inflation (%)	173	5.555	15.438	-99.885	72.578
Growth spillovers (%)	186	1.491	3.405	-10.044	12,897
Polity index (from-10 to 10)	183	4.797	6.154	-8.000	10.000
Length of democracy	187	12.294	15.255	0	51
Deposits (% of GDP)	154	17.995	28.523	0.000	100.200
	Obs.	Frequency (number of occurrences in period 1833-2016)			
War (0,1)	187	15			
Default (0,1)	187	90			
Elections (0,1)	187	58			
Dictatorship (0,1)	187	16			

Table 4: Correlation matrix of variables

	GDP per capita growth	GDP per capita (log)	Time trend	Political instability	Polity index	Length of democracy	War	Default	Elections	Dictatorship	Growth spillovers	Debt to GDP	Inflation	Deposits to GDP
GDP per capita growth	1.00													
GDP per capita (log)	0.10	1.00												
Time trend	0.06	0.98	1.00											
Political instability	0.09	-0.10	-0.07	1.00										
Polity index	-0.21	-0.06	-0.10	-0.54	1.00									
Length of democracy	-0.27	-0.22	-0.24	-0.43	0.63	1.00								
War	-0.56	-0.22	-0.19	-0.08	0.09	0.27	1.00							
Default	0.03	-0.19	-0.08	0.25	-0.19	-0.20	0.06	1.00						
Elections	0.07	-0.05	-0.05	-0.03	0.20	0.09	0.00	0.15	1.00					
Dictatorship	0.15	0.06	0.07	0.56	-0.94	-0.49	-0.07	0.06	-0.19	1.00				
Growth spillovers	0.11	0.08	0.08	0.13	-0.18	-0.08	0.00	0.13	-0.06	0.09	1.00			
Debt to GDP	-0.16	-0.34	-0.34	-0.30	0.50	0.77	0.05	0.08	0.06	-0.36	-0.10	1.00		
Inflation	-0.22	0.38	0.35	0.04	-0.04	-0.30	-0.07	-0.16	-0.06	0.05	0.02	-0.36	1.00	
Deposits to GDP	-0.04	0.91	0.89	-0.29	0.18	0.12	-0.16	-0.17	-0.02	-0.15	0.01	-0.02	0.25	1.00

Table 5: Augmented Dickey Fuller unit root tests

Variable	Test statistic	Critical value 5% (prob.)
	Levels	
GDP per capita (log)	-0.295	-2.884
Political instability	-5.920	-2.884
	First differences	
GDP per capita	-14.239	-2.885

Table 6: Growth and political instability in Greece: OLS baseline estimates

Dependent variable: GDP per capita growth rate				
	(1)	(2)	(3)	(4)
Constant	1.050***	0.075**	1.248***	1.048**
	(0.361)	(0.035)	(0.433)	(0.517)
GDP per capita growth (lagged once)	-0.357	-0.447*		-0.392
	(0.237)	(0.254)		(0.277)
GDP per capita (log, lagged once)	-0.150***		-0.183***	-0.154**
	(0.054)		(0.065)	(0.074)
Time trend	0.002**	-0.0001	0.003***	0.003**
	(0.001)	(0.0002)	(0.001)	(0.001)
Political instability (lagged once)	-0.012**	-0.012**	-0.009**	-0.016***
	(0.005)	(0.005)	(0.004)	(0.005)
War (lagged once)	-0.201	-0.203	-0.114	-0.223
	(0.197)	(0.191)	(0.178)	(0.209)
Default (lagged once)	-0.021	0.026	-0.032	-0.011
	(0.025)	(0.017)	(0.026)	(0.027)
Elections (lagged once)	-0.013	-0.016	-0.017	-0.015
	(0.017)	(0.017)	(0.019)	(0.017)
Dictatorship (lagged once)	0.049**	0.039*	0.040**	0.042**
	(0.019)	(0.019)	(0.019)	(0.019)
Debt (% of GDP, lagged once)	-0.0002*	-0.0003	-0.0001	-0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Inflation (%, lagged once)	0.035	-0.021	0.078	-0.012
	(0.050)	(0.050)	(0.049)	(0.142)
Growth spillovers	0.404*	0.267	0.287	0.399*
	(0.215)	(0.198)	(0.254)	(0.209)
Length of democracy (lagged once)	0.0002	0.00005	0.0003	0.0005
	(0.001)	(0.001)	(0.001)	(0.001)
Deposits (% of GDP, lagged once)				-0.0006
				(0.0009)
Durbin Watson stat.	1.882	1.833	2.194	1.888
R-squared	0.287	0.211	0.220	0.293
Observations	101	101	101	94

† Robust standard errors are reported in parentheses. ***, ** and * denote significance at 5% and 10% levels, respectively.

Table 7: Growth and political instability in Greece: robustness checks

Dependent variable: GDP per capita growth rate			
	(1)	(2)	(3)
	OUTLIERS	RESTRICTED SET OF COVARIATES	ECM
Political instability (lagged once)	-0.009**	-0.011**	
	(0.003)	(0.004)	
Error correction term			-1.066***
			(0.073)
Political instability (lagged difference)			-0.017**
			(0.008)
R-squared	0.353	0.165	
Observations	94	101	183

† Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

1) Estimates of columns 1-2 include the lagged dependent variable, the variables of lagged GDP per capita (in log), time trend, debt (% of GDP), inflation, growth spillovers and the length of democracy. Estimates of column 1 also include the dummy variables of war, default, elections and dictatorship. All estimates include an intercept term. These coefficients are not reported for brevity.

Table 8: Growth and components of political instability in Greece:

Dependent variable: GDP per capita growth rate				
	(1)	(2)	(3)	(4)
Revolutions (lagged once)	-0.063**			
	(0.026)			
Coups (lagged once)		-0.058***		
		(0.015)		
Civil war (lagged once)			-0.170*	
			(0.093)	
Inverse of regime durability				-0.018
(lagged once)				(0.025)
R-squared	0.304	0.298	0.169	0.276
Observations	101	101	101	101

† Robust standard errors are reported in parentheses. ***, ** and * denote significance at 5% and 10% levels, respectively.

Estimates of all columns include the lagged dependent variable, the variables of lagged GDP per capita (in log), time trend, debt (% of GDP), inflation, growth spillovers, length of democracy, war, default, elections and dictatorship.. All estimates include an intercept term. These coefficients are not reported for brevity.

Table 9: Instrumental variable estimates (three stage least squares)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	BASELINE	DEPOSITS (% GDP)	POPULATION SPIKES	RESTRICTED SET OF COVARIATES	OUTLIERS	INFLUENCE OF BRITISH GROWTH	INFLUENCE OF U.S. GROWTH	DEFINITION OF POLITICAL INSTABILITY THAT INCLUDES POLITICAL ASSASINATIONS	LENGTH OF DEMOCRACY AS A REGRESSOR OF POLITICAL INSTABILITY
Dependent variable: GDP per capita growth									
Political instability	-0.085***	-0.130***	-0.071***	-0.088***	-0.076***	-0.097***	-0.075***	-0.076***	-0.077***
	(0.025)	(0.032)	(0.020)	(0.032)	(0.017)	(0.027)	(0.024)	(0.024)	(0.025)
Root mean squared error	0.085	0.111	0.069	0.097	0.068	0.091	0.080	0.080	0.080
Dependent variable: Political instability									
GDP per capita growth	-5.431***	-5.622***	-6.212***	-3.911***	-8.857***	-5.684***	-5.135***	-5.058***	-5.412***
	(1.004)	(0.975)	(1.216)	(0.892)	(1.589)	(0.957)	(1.040)	(1.037)	(0.984)
Root mean squared error	0.814	0.850	0.811	0.822	0.866	0.822	0.806	0.808	0.798
Observations	102	94	102	102	91	102	102	102	102

† Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.
All estimates of the upper panel include the lagged dependent variable, the variables of lagged GDP per capita (in log), time trend, debt (% of GDP), inflation, growth spillovers, length of democracy and an intercept. These coefficients are not reported for brevity. Estimates of the bottom panel include the lagged dependent variable, the variables of GDP per capita (in log), inflation, polity IV index of democracy and an intercept. All estimates except that of column 4 also include the dummy variables of war, default and elections. These coefficients are not reported for brevity.

Table 10: Structural break analysis

Test	Year of break	Test statistic (supremum Wald test)	P value
Number of structural break in the GDP per capita series	1955	34.186	0.000

Figure 1: Cumulative sign of the squared recursive residuals

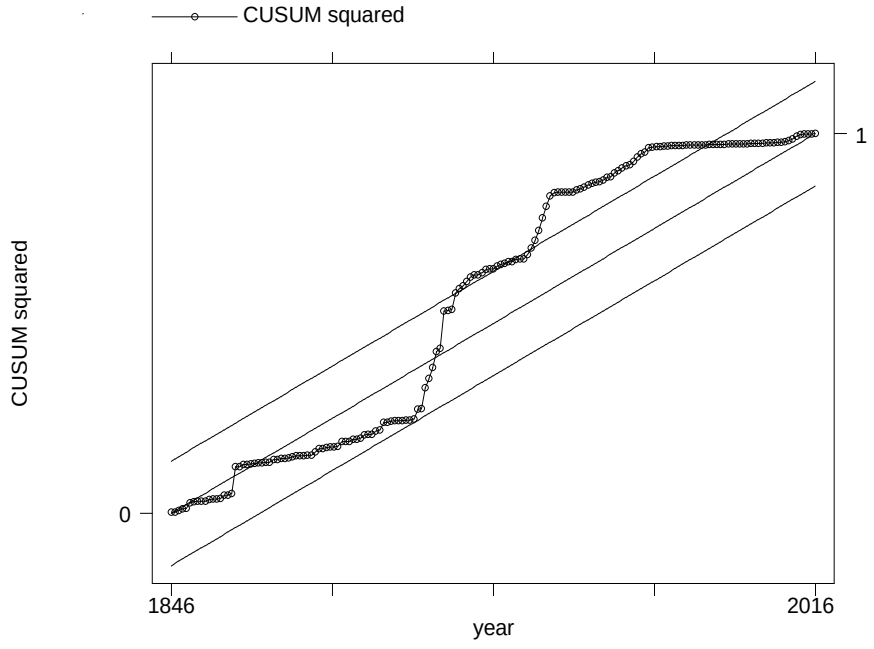


Table 11: Estimates before and after structural breaks

Dependent variable: GDP per capita growth		
	(before structural break of 1955)	(after structural break of 1955)
	(1)	(2)
Political instability	0.197 (0.210)	-0.192*** (0.055)
Root mean squared error	0.169	0.113
Dependent variable: Political instability		
GDP per capita growth	0.012 (0.860)	-4.961*** (1.410)
Root mean squared error	0.759	1.843
Observations	44	57

† Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.
All estimates of the upper panel include the lagged dependent variable, the variables of lagged GDP per capita (in log), time trend, debt (% of GDP), inflation, growth spillovers, length of democracy, default elections, dictatorship and an intercept. Estimates of column 1 also include the dummy variable of war. These coefficients are not reported for brevity.
Estimates of the bottom panel include the lagged dependent variable, the variables of GDP per capita (in log), inflation, polity IV index of democracy, elections, default, dictatorship and an intercept. Estimates of column 1 include also the dummy variable of war. These coefficients are not reported for brevity.

Table 12: Stage of development of the Greek economy

Time period	Economic gap: GDP per capita of the leading economic nation (Great Britain or USA) / GDP per capita of Greece	Share (%) of rural population
1833-39	1.63	79.25
1840-49	2.07	77.13
1850-59	2.06	74.39
1860-69	2.15	75.37
1870-79	2.50	74.19
1880-89	2.37	71.11
1890-99	2.77	69.15
1900-09	3.17	67.39
1910-19	3.95	64.86
1920-29	2.82	59.62
1930-39	2.12	56.31
1940-49	5.28	53.23
1950-59	3.59	49.00
1960-69	2.56	43.45
1970-79	1.81	36.41
1980-89	1.82	32.48
1990-99	1.96	30.31
2000-09	1.80	28.40
2010-16	2.20	27.23

Table 13: Growth effect of political instability at various stages of economic development in Greece

	(1)	(2)	(3)	(4)
	(SHARE OF RURAL POPULATION, LOWEST TWO QUARTILES)	(SHARE OF RURAL POPULATION, HIGHEST TWO QUARTILES)	(ECONOMIC GAP WITH MOST DEVELOPED COUNTRY, LOWEST TWO QUARTILES)	(ECONOMIC GAP WITH MOST DEVELOPED COUNTRY, HIGHEST TWO QUARTILES)
Dependent variable: GDP per capita growth				
Political instability	-0.126**	0.431	-0.135***	-0.044
	(0.053)	(0.300)	(0.034)	(0.031)
Root mean squared error	0.100	0.159	0.083	0.077
Dependent variable: Political instability				
GDP per capita growth	-6.044***	-1.983	-3.589*	-0.961
	(1.535)	(1.201)	(2.047)	(0.921)
Root mean squared error	0.799	0.509	0.716	0.508
Observations	72	30	55	47

† Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.
All estimates of the upper panel include the lagged dependent variable, the variables of lagged GDP per capita (in log), time trend, debt (% of GDP), inflation, growth spillovers, length of democracy and an intercept. They also include the dummy variables of default and elections. These coefficients are not reported for brevity. Estimates of the bottom panel include the lagged dependent variable, the variables of GDP per capita (in log), inflation, polity IV index of democracy and an intercept. These coefficients are not reported for brevity. Estimates of columns 2 and 4 include the dummy variable of war. All estimates except that of columns 2 include the dummy variable of dictatorship.

Table 14: Political instability and growth in Europe

Outcome variable: Growth rate of GDP per capita									
	Effect of revolution			*Effect of revolution in more developed countries*			*Effect of revolution in most industrialized countries*		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Before revolution (1848)									
Control group	0.015	0.020	0.008	0.009	0.020	0.004	0.015	0.020	0.009
Treatment group	0.020	0.025	0.008	0.015	0.025	0.017	0.020	0.025	0.015
Difference (Treatment-Control)	0.005 (0.008)†	0.005 (0.009)	0.000 (0.006)	0.005 (0.009)†	0.005 (0.009)	0.013 (0.012)	0.005 (0.008)	0.005 (0.009)	0.006 (0.012)
After revolution (1848)									
Control group	0.001	0.011	0.010	-0.004	0.011	0.011	0.001	0.011	0.011
Treatment group	-0.073	-0.061	-0.020	-0.077	-0.061	-0.067	-0.073	-0.061	-0.067
Difference (Treatment-Control)	-0.074** (0.037)	-0.072* (0.040)	-0.031 (0.026)	-0.073** (0.037)	-0.072* (0.040)	-0.077* (0.043)	-0.074** (0.037)	-0.072* (0.040)	-0.077* (0.043)
Difference in differences	-0.079** (0.038)	-0.078* (0.040)	-0.031 (0.028)	-0.078** (0.038)	-0.078* (0.040)	-0.090** (0.045)	-0.079** (0.038)	-0.078** (0.040)	-0.084** (0.065)
R-square	0.05	0.07	0.02	0.05	0.07	0.13	0.05	0.07	0.10
Observations	154	145	146	154	145	40	154	145	56

† Clustered standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. All regressions include as explanatory covariates those of GDP per capita (log), inflation, population growth and the polity IV index of democracy. To raise the robustness of the obtained estimates, columns 2, 5 and 8 also include two dummies which indicate the occurrence of an event of war or an event of economic crisis. Estimates of columns 3, 6 and 9 are based on propensity score matching.

Table 15: Trend growth and output gap

	(1)	(2)
Dependent variable	(Trend output per capita growth)	(Output gap)
Political instability	-0.013***	0.013
	(0.000)	(0.022)
Root mean squared error	0.009	0.055
Dependent variable	(Political instability)	(Political instability)
Trend GDP per capita growth	-11.936***	
	(3.415)	
Output gap		2.188
		(2.147)
Root mean squared error	0.801	0.755
Observations	102	102

† Robust standard errors are reported in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

All estimates of the upper panel include the lagged dependent variable, the variables of time trend, growth spillovers, inflation, debt to GDP, length of democracy, war, default, elections, dictatorship and an intercept. Estimates of column 1 also include the lagged level of trend GDP per capita (in log). These coefficients are not reported for brevity. Estimates of the bottom panel include the lagged dependent variable, inflation, polity IV index of democracy, war, default, elections, dictatorship and an intercept. Estimates of the bottom panel of column 1 include the variable of the trend output per capita. These coefficients are not reported for brevity.