Abstract:
A multidimensional model of "sustainable development" has been developed within the framework of major international environmental conferences. This framework encompasses the economic, social and ecological aspects of long-term responsibility. To meet the challenges of these aspects of sustainable development treated within the framework, all countries must address the protection of natural resources, the preservation of social cohesion, the promotion of knowledge and innovation and the reduction of public debt.

This raises the question whether the "Churchill hypothesis" of the relative superiority of democratic regimes as compared to autocratic ones can be confirmed in terms of their sustainability performance. Based on theoretical considerations, this issue is examined with a quantitative analysis that includes one hundred and forty countries. Results show that democratic states have a comparative advantage in providing important future goods (social sustainability, long-term protection of the basic quality of life, environmental protection). At the same time, democracies are not clearly superior in all areas (economic sustainability, finance consolidation). Thus, the regimes effect can be overshadowed by other influencing factors and varies depending on the regime subtype.

Catchwords:
Sustainability, regime type, performance measurement

1. Introduction
In the course of the major international environmental conferences (Rio, Johannesburg, Copenhagen), participants have formulated a general principle of sustainable development, that consists of several dimensions embracing economic, social and ecological aspects of long-term
future responsibility. All societies and countries are therefore urged to confront key future challenges. These include, for example, the protection of natural resources, the preservation of social cohesion under conditions of social change, the promotion of knowledge and innovation, and the problem of fiscal consolidation. The interests of future generations should become an integral part of today's policy-making by the production of "political future goods".\

According to the "Churchill hypothesis", which describes democracy as the relatively best regime type, a large part of the research literature assumes advantages of democracy in their sustainability performance as compared to non-democratic regimes (Schmidt 2005; Halperin et al 2008). This assumption is based on the results of numerous studies demonstrating the strengths of democracy in their "very own core areas of expertise" as input legitimation (through free and fair elections), guarantee of participation and the consideration of preferences of today's (voting) citizens (Schmidt 2010, p. 474f.)

However, it is debatable to what extent these conclusions are empirically correct. If one looks at the policy performance of countries with different regime types and degree of democratization in the indicated problem fields of sustainable development, one could get the impression of a "future failure" of many established democracies (Theisen 2000a), while one can also observe remarkable (at least area-specific) successes of various autocracies. So it is rarely possible even for economically prosperous democracies of the OECD-world to meet the needs of ecologically sustainable development (Niessen 2007; Saretzki 2007). And even regarding social and economic challenges of the future, some of these established democracies show larger problems than their proponents assume. In contrast, at least same autocracies seem to have fulfilled their commitments in regard to these challenges in similar or even better ways. A systematic-empiric examination of these interrelations in regard to all problem areas has not been conducted until the present today.

This gap in research and knowledge is even more astonishing considering that doubts about

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2 It is Key for a systematic, goal-oriented performance to produce regime overlapping goods by the effective achievement of substantial goals which are binding for all political systems (Roller 2002, p. 550ff., 2004, p. 304). These should have a strong reference to the future (Höffe, 2009).
3 Winston Churchill described democracy in 1947 as follows: "No one pretends that democracy is perfect or all wise. Indeed, it has been said that democracy is the worst form of Government expect all those other forms that have been tried from time to time." (Churchill 1974, p. 7566).
4 In particular, see the literature about the problems of democracy in Brodocz et al. 2008; Greven 2009; Schmidt 2010.
superiority of the democracy also appear under the aspect of political theory. Thus, based on an actual debate about the “negligence of the future in democracies” (Theisen 2000b; Kielmansegg 2003; Schmidt 2010) reaching back at least to Tocqueville (Tocqueville 1951), the question appears of whether a democracy doesn’t after all have special difficulties integrating the interests of future generations in its political decision processes. This could be because of a democracy’s its core interest to pursue the preferences and interest of people living today in a way as optimal as possible (Höffe 2009).

In the following, against the background of the existing empirical research gap, not only the current “sustainability performance” of democracies and autocracies in relevant policies shall be compared, but also the specific “sustainability effect” of a regime type should be analyzed. Thereby, the influence of the regime type on the sustainability rating is tested in comparison to the effect of other explaining variables using quantitative analyses of international comparison.

A contribution to the linkage between the discourse on democracy and sustainability can be made by answering the following questions:

- Which results can be achieved by democracies and autocracies in regard to their sustainability ratings today? Can systematic performance patterns be detected beyond the respective regime types (in regard to subtypes)?
- Does the factor of the degree of democratization or autocratization really play a significant role for the sustainability performance of a country or is sustainability performance not much more influenced by other factors?

Before the effect of the degree of democratization or autocratization on the actual performance ratings of countries is determined with the help of regression analyses in chapter 5, in the first place, the target dimensions of sustainable development have to be discussed in chapter 2 and be made available for an operationalization. In chapter 3, hypotheses on the expected regime effects and the presentation of several control variables follow the remarks about regime types and questions in regard to the measurement of democratization and autocratization, which are treated

5 Altogether, 140 countries were included in the analysis, whose sustainability performance was measured for the year 2006. Beside the micro-states (under 2 million inhabitants) all countries were considered. For validating the data, results of a cross-section analysis of the year 2006 were also compared to the results of the year 1996 in order to raise the robustness of the analysis.
in chapter 2. Chapter 4 presents the empirical findings of the performance comparison between the included democratic and autocratic regimes (or several subtypes). Finally, in chapter 5, the individual results are summed up and evaluated.

2. Theoretical foundations

2.1 Sustainable development

Within the sometimes strongly normatively charged discussion about aspects of responsibility towards future generations (Jonas 1979; Birnbacher 2001), of justice among generations and of the provision for the future (Wurster 2009, 2010), a quite vast literature landscape especially about the question of sustainable development has been developed (Grunwald and Kopfmüller 2006; Von Hauff and Kleine 2009).

The Brundtland Commission defined sustainable development already in 1987 as follows: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Hauff 1987). Since the Rio Summit of 1992, in the sense of a “magic sustainability triangle” sustainable development does not refer any more only to the long-term protection of the environment and of resources, but also to the same extent to the realization of social and economic goals (Von Hauff u. Kleine 2009, p. 9). In the sense of a both intragenerational and intergenerational justice, it is a question of an enlargement of political responsibility beyond the today living generations to a responsibility also for future generations (Grunwald and Kopfmüller 2006, p. 27; Von Hauff and Kleine 2009, p. 7).

The debate about the theoretical concepts of sustainable development is extremely controversial, but this is true even more for the decision what concrete aims of a sustainable policy shall be pursued. Provided that the sustainable development of a society can be guaranteed by adapting as optimally as possible to the most important future changes and problems, the identification of future global challenges must attached highest importance to a more detailed operationalization of sustainability goals. The evaluation of several Delphi surveys (Kreibich 2003; Henry-

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6 For the quantitative description and explanation of the performance results in a two-stage process the paper will firstly refer to comparisons of means. In a second step, the findings obtained from this comparison shall then be deepened in much more complex multivariate regression analyses. The influence of single explaining variables in contrast to other ones can be measured with the help of regression analyses and thereby an exact picture of the interdependencies can be drawn.

7 See on the controversy about strong and weak, substantial and procedural sustainability as well as the one- and more-column concepts Grunwald and Kopfmüller 2006, p. 37ff.
Huthmacher and Von Wilamowitz-Moellendorf 2005) allows the conclusion that especially the following key trends can be seen as such global challenges:

- The increasing globalization and the more and more intensified international competition between different locations,
- The transformation from an industrial society to an information society,
- The excessive burden on the public budgets because of the enlargement of state responsibilities,
- The thread to natural resources by the increased environmental pollution,
- The scarcity of natural resources by an increasing overuse.

A sustainable future-oriented policy at the beginning of the 21st century is characterized in all countries especially by the fact that already today a country tries to react to these future challenges. The importance given to the solving these challenges can be illustrated by crucial international agreements of the last decades. In the context of the follow-up to the Rio Summit not only the general principle of a sustainable development was established, but there was also an attempt to react to the adumbrated ecological challenges by a climate frame, biodiversity and forest convention (Von Hauff and Kleine 2009, p. 8). Highest priority was given to securing an elementary education as well as to the diminution of hunger and underfeeding, an improved healthcare and the increase of the life expectancy by means of the UN Millennium Goals of the year 2000 (Grundwald and Kopfmüller 2006, p. 25). Finally, apart from the goals in the context of the above international agreements numerous national sustainability strategies (Bundesregierung 2002) refer to the importance of a long-term budget consolidation and the promotion of scientific innovation and competitive ability as reaction to the globalization and the transformation from an industrial to an information society.

If one would like to compile a list of central sustainability goals for today against this background8, it can be justified well, with regard to the economic dimension, why apart from the budget consolidation also a continuous improvement of the public infrastructure and of the

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8 Of course, not all, but only few central goals can be included and further analyzed according to the remarks made before.
innovative and competitive ability (science promotion) is recommended. In the context of social sustainability a matters is also the grant of fair social chances of participation also for future generations by increasing the human capital in a society in the context of elementary education as well as further education. Furthermore, the life expectancy of children born today should be increased by appropriate measures of health protection. Finally, based on the ecological dimension of sustainability climate and environmental protection and a reduction of resource consumption must be promoted.

In order to be able to measure the performance in these nine mentioned allowances for all countries, one indicator was chosen for every sustainability goal which is appropriate to measure the goal as validly as possible for the year of 2006 (Table 1)⁹.

Table 1: Goal indicators of sustainable development

<table>
<thead>
<tr>
<th>Goals of sustainable development</th>
<th>Used performance indicator</th>
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<tbody>
<tr>
<td>Finance consolidation</td>
<td>National debt as percentage of the GDP in 2006 (or in the most recently available year). Source: The World Bank 2011</td>
</tr>
<tr>
<td>Quality of infrastructure</td>
<td>Safe internet servers per one million people in 2006 (or in the most recently available year). Source: The World Bank 2011</td>
</tr>
<tr>
<td>Elementary education</td>
<td>Graduations at primary school as percentage of the relevant age group in 2006 (or in the most recently available year). Source: The World Bank 2011.</td>
</tr>
</tbody>
</table>

⁹ In context of the mentioned variables, see also the very similar sustainability indicators of Grunwald and Kopfmüller 2006, p. 65 ff. It shall be measured to what extent the countries are able to provide important future goods for a sustainable development of their societies already today. While forgoing data which are based on uncertain forecasts for the future, a reliable basis of valuation shall be established by the actual performance measurement.
<table>
<thead>
<tr>
<th>Climate protection</th>
<th>CO2-emissions in metric tons per head in 2006 (or in the most recently available year). Source: The World Bank 2011.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preservation of resources</td>
<td>GDP per consumed energy unit in 2006 (or in the most recently available year). Source: The World Bank 2011.</td>
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</tbody>
</table>

Within the economic, social and ecological dimensions, the three performance indicators corresponding to one dimension were summed up to a additively aggregated index in order to be able to offer an overview for each sustainability dimension apart from the detailed analysis. For doing so, the different basis values of the single indicators were firstly $z$-transformed and thereby standardized and then summed up in the respective index after being corrected in their direction and equally weighted\(^{10}\).

2.2 Regime type

Before it is possible to consider the connection between sustainability and regime type in the following chapters, after the depending ones also the independent variable of the regime type considered as a central variable has to be defined. Speaking about political regime types one can think of a continuum of possible characteristics having at its one pole the ideal (stable and inherent) democracy and at its other pole a perfect autocratic (totalitarian) regime (Merkel 2010, p. 25). However, which are constituent characteristics permitting a distinction as clear as possible between the regime types? On the basis of which central aspects democracies, in which the majority of the people shall reign, can be distinguished from autocracies, in which all relevant power of decision lies with one unique, neither in terms of personnel nor institutionally limited autocrat (a single person or a collective actor)?

In contrast to a very broad definition of democracy which is expressed in the Gettysburg formula (“Government of the people, by the people, and for the people”, Lincoln 1863) or in the concept of the “embedded democracy” considering political and civil freedom as well as equality and

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\(^{10}\) See on distortion effects occurring in the aggregation of $z$-transformed values Munck and Verkuilen 2002.
control as constitutive characteristics of a democracy (Merkel 2010, Croissant 2010, S. 95), a concept as lean as possible shall be used for the distinction of regimes in the following. Based on the definition of democracy by Dahl (“Public contestation and the right to participate”, Dahl 1971) the existence of “contested elections” shall be pointed out as a central criterion for the distinction between democracy and autocracy. In order that a regime can be classified as democratic, both executive and legislative have to be legitimized by means of elections, whereby the opposition must have a real chance to win at the elections. Three conditions have to be fulfilled to this end:

1.) Ex ante uncertainty: the outcome of the election is not known before it takes place

2.) Ex post irreversibility: the winner of the electoral contest actually takes office

3.) Repeatability: elections that meet the first two criteria occur at regular and known intervals” (Cheibub, Gandhi and Vreeland 2009a, p. 69).

Only if these conditions are fulfilled, one can speak of a democracy, whereas in the other case we deal with an autocracy. The advantage of the chosen narrow definitional discrimination, which does not include neither aspects of the separation of powers nor of the civil rights, is given by the fact that this definition examines central institutional and procedural regime characteristics, but does not include the policy dimension of democracy. Based on the chosen definition it is possible to design a “lean indicator” which is especially appropriate for the policy analysis carried out here.

Meanwhile there is a multitude of surveys one can refer to for a precise measurement of regime types and of the degree of democracy or autocracy (Lauth 2004; Hadenius and Teorell 2007; Marshall et al. 2010). The actual “Democracy and Dictatorship” data set by Cheibub, Gandhi and Vreeland (Cheibub, Gandhi and Vreeland 2009a, 2009b) has been chosen for the analysis because it is not only based on the above mentioned criteria differentiating between the regime types and offers a comprehensive data set in a longitudinal and cross-sectional comparison, but

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11 Beyond this advantage, a precise distinction between the regime type (democracy/autocracy) and the question if a country is a constitutional state (grant of civil rights) is possible.

12 According to this a regime can be seen as democracy if all following conditions are fulfilled: “1. The chief executive must be chosen by popular election or by a body that was itself popularly elected. 2. The legislature must be popularly elected. 3. There must be more than one party competing in the elections. 4. An alternation in power
also is characterized by a high construct and content validity and allows a further distinction by regime subtypes. After the dichotomous distinction between democracy and autocracy, parliamentary, semi-presidential and presidential subtypes can be distinguished within the democratic spectrum with the help of this data set\textsuperscript{13}. However, the autocracies can be further divided up into civil dictatorships, military dictatorships and monarchies\textsuperscript{14}.

\textbf{3. Hypotheses}

Before going into the measurement of results, it is possible, on a theoretical level, to reflect about the relationship between sustainability and regime type. Therefore, basic approaches of the system, institution and actor theory are analyzed systemically in regard to their contents.

With the help of political system theory (Easton 1965; Luhmann 1984) several aspects important for the policy effect of the regime type can be stressed. It can be argued, that an autocracy, which must usually enforce its policy decisions with the aid of one form or another of repression, is handicapped in two ways in comparison to a democracy, which has a far higher degree of input legitimacy (expanded participation rights). On the one hand, an autocracy can accelerate the realization of policy goals regarded as central ones by means of repressive measures (high capacity to act). On the other hand, such a performance optimization strategy, which is usually, if ever, only possible for a few political goals (mostly in the economic field), leads to the situation, that the functional differentiation, which is important for an overall system development, is impaired\textsuperscript{15}. Repression and excessive political influence can in autocracies overlap function logics (subsystem codes) of other subsystems (economy, society, culture). This can lead to significant frictions and an inefficient policy development. Such a problem is even aggravated by the dictator's dilemma detected by Wintrobe (Wintrobe 1998, 2009). The massive use of

\textsuperscript{13} A distinction is possible by answering the two successive questions: “1. Is the government responsible to the assembly? 2. Is there a head of state popularly elected for a fixed term in office?” (Cheibub, Gandhi and Vreeland 2009a, p. 81).

\textsuperscript{14} A precise differentiation of the cases in the data set is granted by answering the successive questions: “1. Who is the effective head of government? 2. Does the head of government bear the title of “king” and have a hereditary successor and/or predecessor? 3. Is the head of government a current or past member of the armed forces? 4. Is the head neither monarchic nor military?” (Cheibub, Gandhi and Vreeland 2009a, p. 87).

\textsuperscript{15} In regard to a further development and modernization of a society in a sustainable direction this differentiation is of great importance.
repressive measures many autocracies depend on because of their little input legitimization\textsuperscript{16}, leads to a distorted perception of reality by the political leadership over the time, as the government is not supplied any more with reliable information by the subjects (insufficient political feedback loop). At the latest in the phase of policy implementation, this fact leads to systematically suboptimal results as one can guess.

In the end, however, it can be stated from a system-theoretical perspective that apart from the characteristic of the regime type the sustainability performance of a country is influenced by the system environment (Easton 1965, S. 32) and here especially by the economic conditions (Keefer 2007). Therefore, considering the economic stage of development\textsuperscript{17} and the resourcing of a country in the later analysis models as potential explanatory variables is useful\textsuperscript{18}.

Approaching the possible relationship between regime type and sustainability from the perspective of institution theory, aspects of rule transition, control and enforcement should be considered. Basically, one can proceed from the assumption that stable and predictable institutional arrangements rather facilitate a sustainable policy which relies on a long-term stable framework (Przeworski 1991; Przeworski et al. 2000; Olson 2000; Gandhi u. Przeworski 2007; Gandhi 2008). Following I Miquel (I Miquel 2007) especially autocracies are characterized by significantly less institutional stability in contrast to democracies. Opposite to the latter they have much more difficulties in organizing a regulated transition to a new ruler without fundamental regime upheavals\textsuperscript{19}. The instabilities and ruptures provoked by these radical changes can be a heavy burden for a sustainable policy\textsuperscript{20}.

As a further institutional aspect one has to deal with the question of rule control. In this context, one can argue that a lack of public control (as it exists in autocracies) can impede a sustainable

\textsuperscript{16} The degree of repression, however, can vary greatly from one authoritarian regime to the other. In the following, it is assumed that especially military regimes use systematically these means.

\textsuperscript{17} It is still controversial to what extent according to the modernization theory of Lipset (Lipset 1959) a close causal connection between the economic development of a country and its degree of democratization exists (Sunde 2006). In the sample selection conducted here the correlation of both variables did however not reach such high level that they could not be tested in a regression model together.

\textsuperscript{18} It can be supposed that a country with a high economic development level and large raw material inventories should have fewer problems ceteris paribus to invest for the future in regard to economic and social aspects. Albeit a high economic stage of development can also have negative effects on the ecological sustainability rating due to environmental pollution effects.

\textsuperscript{19} This is not the case in monarchies with regulated dynastic rule changes.

\textsuperscript{20} Even the uncertainty about the long-term survival of an authoritarian regime can cause a way of ruling which is inefficient and conducive to short-term goals (I Miquel 2007).
policy over the time. Even if one process from the Stationary-bandit thesis by Olson (Olson 1993), which states that an expectation of a long reign period can also lead in autocracies to a long-term goals oriented policy, the danger of degeneration of authoritarian rule stays latent in the case of a missing effective government control. In contrast to this, the transparent and publicly controlled decision-making processes in democracies guarantee their learning and error correction capability (Tocqueville 1951). This is true because deficiencies become rather known (early warning system) and the rulers in democracies are encouraged by their accountability towards the citizens to constantly look for better policy solutions\textsuperscript{21}.

With regard to enforcing political decisions, one can criticize about democratic systems in contrast to autocratic regimes that as the other side of the coin of „Checks and Balances“, they have special difficulties to force through unpleasant and hard reforms. It is hardly possible for them to reign without resistance because of an often high number of institutional power limiters and veto players (Tsebelis 2002), whose number may vary according to the regime subtype\textsuperscript{22}. This can lead to lengthy and tough decision-making and negotiation processes which can end with results on the level of the lowest common denominator of all participating actors (Scharpf 1997). Thus, the system can fail in delivering a possibly optimal problem solution.

Also the institutional approaches draw attention to the fact that beside the regime type maybe other factors, especially the regime age and the degree of rule of law, could be important for the sustainability performance. Hence, corresponding explanatory variables as well as dummy variables for monarchical autocracies (controlled transition rule) and for military dictatorships (high repression inclination) are included in the later following regression analyses.

If one concentrates on another policy-relevant aspect, i.e. the access to power, the actor-related rational choice approach by Bueno de Mesquita et al. (Bueno de Mesquita et al. 2002; Bueno de Mesquita et al. 2003) is appropriate as an explanatory model. Adherents to this concept believe that the opportunity to gain influence on political decisions in democracies is basically created much wider than in autocracies. As the “selectorate” in democracies unlike in autocracies consists of all voting citizens, a government must satisfy the interests of broad segments of the population

\textsuperscript{21} However, it is controversial to what extent a functioning rule of law is a functional equivalent to deselection options.

\textsuperscript{22} For example, it is ceteris paribus higher in systems with a divided executive (presidential and semi-presidential democracies) than in parliamentary democracies.
to a much higher extent in order to be able to create a „winning-coalition“ as fundament of its rule. For autocratic rulers, who only have to consider the interests of a very small “winning-coalition”, usually consisting of major military, senior party delegates or economic elites, it is in particular rational to provide private goods (means that prefer specific population groups exclusively). Democratic governments, however, need to offer a much greater amount of public goods with a high common welfare regard.

However it is crucial for the question of the sustainability impact to which extant the interests of future generations are neglected by the “selectorate”, which also in democracies can only consist of all today living (voting) citizens. Such a consideration of interests seems feasible in democracies, especially if one can suppose that there are also distinct advantages for the majority of today's generation. The less this is true (see Birnbacher 2001 on the problem of discounting the future), the less there should be given a possible democracy effect. In this context, an important intervening variable is the aging structure of a society. Thus, it will be considered as an independent variable in the later following regression analysis.

Taking a closer look on the policy process level in the following, the latter maybe appears to be the core problem of democracy in regard to sustainable development. This core problem is created in a democracy by its short-lived political time clock. The permanent focus of a democratic government on the acute management of upcoming challenges under the pressure of a short-term deselection and the impression of a permanent campaign atmosphere (Linz 1998) aggravate long-term planning and decision making processes, but also increases the permanently present risk of an excessive weighting of present interests and of shifting the solution of long-term problem to the future (Kielmansegg 2003). An autocratic ruler who is firmly in the saddle might be able to escape easier from such a short time based policy making.

The political theory of competition by Besley and Kudamatsu (2007) is also positioned on the policy level. This theory assumes, however, as opposed to the ideas just presented, that

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23 Thereby, it becomes rather possible that stakeholders, such as environmental organizations representing future-oriented policy interests gain a hearing.

24 On the one hand it can be argued that the interests of the following younger generations, which are hard to organize in an aging society, are systematically neglected (Weede 1990) due to the existence of powerful distributional coalitions formed by older population groups (Olson 1982). Even so on the other hand a positive correlation between the degree of aging of a society and its sustainability performance can be detected. In an aging society experience and know-how are accumulated as an important resource of sustainability.

25 Whereas democracies usually provide a long-term stable institutional framework, political processes taking place within this framework tend to be aligned on a short time horizon.
democracies are characterized by incentives to permanent policy optimization due to the strong political competition within the democratic regime (see also Schmidt 2010 on the raised “political productivity” of a democracy). Exactly such incentives are missing in a consolidated autocracy. Because of this fact it’s medium to long term innovation ability and therefore its overall development can be affected negatively.

A strong involvement in international processes could be a functional equivalent of such a competitive pressure from the inside (increased competition from abroad). Thus, the transnational interconnectedness of a country (measured by the degree of openness of its economy) was chosen as a control variable for the later following analysis. In Table 2 all relied explanatory factors (control variables) are listed and a description of their exact operationalization is given.26

Table 2: Explanatory factors for sustainable development

<table>
<thead>
<tr>
<th>Explanatory factors</th>
<th>Description</th>
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<tbody>
<tr>
<td>Energy imports</td>
<td>Net energy imports as a percentage of energy consumption in 2005 (or in the most recently available year). Source: The World Bank 2011.</td>
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<tr>
<td>Age of regime</td>
<td>Years, the current regime exists in 2005. Source: Cheibub, Gandhi u. Vreeland 2009b.</td>
</tr>
<tr>
<td>Population Aging</td>
<td>Share of the population over 65 years of total population in 2005 (or in the most recently available year). Source: The World Bank 2011.</td>
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<tr>
<td>Openness of economy</td>
<td>Import and exports relative to GDP in 2005 (or in the most recently available year). Source: The World Bank 2011.</td>
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</table>

26 All potential explanatory factors were collected for 2005. Due to the difficulty to determine the exact time delay for the effect of individual factors, it was generally considered a time lag of t-1 years.
Weighting all arguments carefully after the analysis of the various theory threads, despite notable objections (possibility of political blockages, short-term political timing cycle, high fixation on the present) the points speaking for superior sustainability performance of democracies (high level of institutional stability, strong government control, widespread interest considering potential, increased error-correction and learning capability, strong competitive orientation) prevail. Backed by the comparison of several theoretical schools of thought these arguments seem so important that a significant positive effect of democracy can be assumed. It is expected to still remain the same, even when the other mentioned potential influencing factors (economic development, wealth of resources, demographics, etc.) are considered in the investigation.

Furthermore, the theoretical preparatory work realized so far allow differentiated statements regarding supposed systematic performance patterns on the level of regime subtypes. Also following the considerations of Brooker (2008, 2009) the different regime subtypes might vary in their inclination to repression and to participation as well as in their institutional stability and ability to reform. Whereas the potentially higher ability to reform combined with a lower density of veto players could give the parliamentary systems advantages over the presidential ones, the transition of power in monarchies, which tends to be regulated, should be the huge advantage of the latter for a sustainable performance development over the other autocratic subtypes. In contrast to this military dictatorships, which are based upon repression mechanisms and a relatively small “winning coalition” should especially have problems with the performance optimization in the policies analyzed here.

On the basis of these theoretical considerations the following hypotheses can be formulated, which in the following shall be checked for their empirical content:

**Hypothesis 1:** The democratic countries are characterized by a better performance in all goal dimensions of sustainable development than the autocratic ones.

**Hypothesis 2:** Below the regime type, on the level of the respective regime subtypes systematic performance differences can be detected.

**Hypothesis 2a:** Within the spectrum of democratic countries parliamentary regimes achieve better results than semi-presidential and presidential ones.
Hypothesis 2b: Within the spectrum of autocratic countries monarchies achieve the best results, military dictatorships the worst ones.

Hypothesis 3: A positive regime effect in favor of the democratic countries is preserved in all goal dimensions also after checking the influence of the other explaining variables (control variables) included in the analysis.

4. Comparison of Performance

If a mean comparison test between democracies and autocracies is conducted for the three sustainability dimension and the nine chosen single indicators (see Table 3), then, generally, the better results of democracies strikes one’s eye. However, a closer examination reveals clear differences according to the field of study and the regime subsystems.

A great deviation from the general pattern of the superiority of the democracy is noticed at the very first indicator, state indebtedness. Here the mean comparison test (Table 3; column 2) states that by no means do democracies have better results than other states. Instead, monarchies achieve a significant better result with an average of 49,19 percent of the GDP deficit debt than the parliamentary (55,92% of GDP), the semi-presidential (54,74% of GDP) and the presidential democracies (65,27% of GDP). Their performance is only undercut significantly by the military dictatorship (102,06 percent of the GDP)\(^\text{27}\).

\(^{27}\) A detailed consideration of individual country results shows that especially autocracies abounding in resources (Kuwait, Russia or Saudi Arabia) succeed in outdoing the partly very weakly positioned democracies (e.g. Belgium, Greece, Italy and Japan). However, some African developing countries have the highest debts, whereas most of the threshold countries (China) achieve quite good results.
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</thead>
<tbody>
<tr>
<td>Parliamentary Democracy</td>
<td>55,92</td>
<td>210,66</td>
<td>0,000453</td>
<td>0,70</td>
<td>92,11</td>
<td>54,49</td>
<td>75,78</td>
<td>0,70</td>
<td>7,31</td>
<td>11,92</td>
<td>6,97</td>
<td>0,00</td>
</tr>
<tr>
<td>Semi-Presidential Democracy</td>
<td>54,74</td>
<td>64,55</td>
<td>0,000185</td>
<td>0,02</td>
<td>87,92</td>
<td>43,64</td>
<td>70,16</td>
<td>0,30</td>
<td>4,72</td>
<td>16,84</td>
<td>5,85</td>
<td>0,15</td>
</tr>
<tr>
<td>Presidential Democracy</td>
<td>65,27</td>
<td>57,51</td>
<td>0,000089</td>
<td>-0,17</td>
<td>89,21</td>
<td>29,01</td>
<td>68,89</td>
<td>0,08</td>
<td>2,54</td>
<td>15,49</td>
<td>7,05</td>
<td>0,40</td>
</tr>
<tr>
<td>Civilian Dictatorship</td>
<td>65,53</td>
<td>2,30</td>
<td>0,000013</td>
<td>-0,41</td>
<td>76,59</td>
<td>18,42</td>
<td>60,44</td>
<td>-0,52</td>
<td>3,04</td>
<td>5,32</td>
<td>3,63</td>
<td>-0,17</td>
</tr>
<tr>
<td>Military Dictatorship</td>
<td>102,06</td>
<td>18,60</td>
<td>0,000054</td>
<td>-0,40</td>
<td>65,85</td>
<td>13,29</td>
<td>61,92</td>
<td>-0,56</td>
<td>2,07</td>
<td>1,57</td>
<td>5,97</td>
<td>0,24</td>
</tr>
<tr>
<td>Monarchy</td>
<td>49,19</td>
<td>15,44</td>
<td>0,000041</td>
<td>-0,23</td>
<td>89,01</td>
<td>20,04</td>
<td>73,14</td>
<td>0,11</td>
<td>14,04</td>
<td>1,56</td>
<td>4,61</td>
<td>-1,22</td>
</tr>
</tbody>
</table>
Democracies do better somewhat in the field of infrastructure quality when measured for the number of secured Internet networks. Especially in this area, parliamentary democracies (210.66 Internet servers per 1,000,000 people) perform well in comparison to autocratic subtypes (Table 3, column 3). A similar situation exists in research performance when measured by the number of articles produced per capita (Table 3, column 4). In this case, as in the infrastructure performance, a study of the results of individual countries however shows that the high democratic averages are largely caused by the group of OECD countries.

The overall index for economic performance (Table 3, column 5) basically reflects the same phenomena. After the above-average (parliamentary, 0.70) democracies, one's attention is drawn, in strong contrast to the below-average performance of civilian (-0.41) and military dictatorships (-0.40), to monarchies that perform quite acceptably (-0.23).

Monarchies achieve an even better performance on average when examined for the social dimension of sustainability (Table 3, column 9). These results are based on relatively high rates of primary education (89.01% primary graduation rates for relevant age groups, Table 3, column 6) and advanced education program completions (20.04% tertiary graduation rates for the relevant age groups, Table 3, column 7). With an average life expectancy of 73.14 years for newborns (Table 3, column 8), monarchies begin to encroach upon territory only enjoyed by democratic subtypes that achieve clearly better results in almost all other social indicators than non-democratic regimes.

Within this same context results are much more differentiated in the climate protection rating when measured by CO₂ emissions per capita (Table 3, column 10). Besides the Monarchies (rich in natural resources), especially parliamentary democracies are the highest CO₂ producers with an annual average of 7.31 metric tons per capita. Military dictatorships, on the other hand, emit

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28 The impact of the economic stage of development becomes apparent especially by the fact that less developed democracies achieve hardly better results in regard to the two indicators than their autocratic counterparts, whereas economically developed autocracies as for example Singapore can achieve results clearly above the average.

29 Reaching a performance value of 0.11, they succeed even in slightly surpassing the average value of presidential democracies (0.08).

30 Whereas in regard to both indicators individual autocracies (e.g. Cuba) achieve at least similarly good results as the developed western industrial countries, especially the African developing countries achieve much lower results.

31 In particular, the military dictatorships achieve especially low performance values in regard to all social sustainability indicators (65.85 % as quote of primary graduation, 13.20 % as quote of the tertiary education, 61.92 years as average life expectancy for newborns), closely followed by the civil dictatorships. Within the democratic spectrum the especially good results of parliamentary democracies strike one’s eye.
relative few greenhouse gases\textsuperscript{32}. Democracies perform clearly better however when, after greenhouse gases, one closely considers their environmental protection measures (percentage of renewable energy). The comparative averages, (Table 3, column 11), show significantly higher share of renewable energy in the whole energy consumption in all democratic subsystems while Monarchies demonstrate particularly poor performance in this field (only 1.56\%). When examining a conservation of resources achieved via high energy production (measured by the GDP produced per consumed energy unit, Table 3, column 12), the last factor analyzed here, results are similar\textsuperscript{33}. Altogether, democracies achieve significantly better overall environmental performance (Table 3, column 13), especially considered against the clearly under-average results of monarchies.

All in all, with the exception of CO\textsubscript{2} emissions and governmental debt, democracies considerably out-perform non-democracies in sustainability\textsuperscript{34}. While on the one hand parliamentary systems within the spectrum of democratic countries rate better than their counterparts, at least in the economic and social dimension, monarchies fare a little better than their fellow autocratic regimes. In contrast, the otherwise weakly-performing military dictatorships achieve relatively good results with respect to environmental sustainability.

At this point it is important to point out the widely-varying results among individual sustainability indicators. The distribution within a regime type, depending upon the indicator, can reveal very respectable ratings. This shows that comparative averages alone are not sufficient in explaining performance results. Rather, it is useful, in view of the now following regression, to bring a greater number of explanatory variables into the analysis.

\textsuperscript{32} A closer look at the level of single countries shows that apart from some developed industrial nations (Australia, Canada, USA) especially autocracies which are abounding in resources (Kuwait, Oman, Saudi Arabia) or economically developed (Singapore) are responsible for a high degree of greenhouse gas emissions.

\textsuperscript{33} A certain exception exists only as to the military dictatorships which achieve a performance slightly above the one of semi-presidential democracies (5.97 \% GDP produced per consumed energy unit).

\textsuperscript{34} By the way, the results presented here are also preserved if similar analyses are conducted using performance data of 1996.
5. Regression analyses

The regressions whose results for the three goal dimensions of sustainable development are presented in Table 4 and for the nine analyzed sustainability indicators in Table 5 (in the appendix), call attention to a multitude of interesting coherences\(^{35}\).

If one firstly regards the goal dimensions of economic sustainability (Table 4; column 2), it becomes clear that the characteristics of the regime types cannot make a significant contribution to the explanation\(^{36}\). However, a high level of the economic development and a strong enforcement of the rule of law in a country are key to a good performance result. This profile also proves true when looking at the single indicators of infrastructure quality (Table 5; column 3) and research performance (Table 5; column 4). According at least to the results of the regression calculations, apart from an already reached level of economic development legal security and general conditions reliable in the long run (great regime age) play an important role for providing these future goods\(^{37}\). On the other hand, the theoretically expected democracy effect is less important\(^{38}\).

The opportunities to participate in a democracy seem to have also no significant positive influence on the containment of public debt\(^{39}\). In a weak overall explanation model (Table 5; column 2) only a significant link between a high economic stage of development and a public debt tending to be high can be detected\(^{40}\). On the other hand, the public debt decreases, if a

\(^{35}\) In the tables a regression model is included for each sustainability dimension respectively each performance indicator which contains all explaining factors from Table 2. As the number of included countries alternates slightly because of data restrictions depending on the respective regression model, in order to validate the results (adjustment of sample results) all models were calculated also for a core sample of countries for which all data were available across all indicators. Although hereby it comes to a certain shift as to the size of the individual regime groups (the fraction of democracies increases and the fraction of autocracies decreases), the results presented here are practically completely preserved. That is why the presentation of these results in the following is dispensable. This is also the case for the regression models calculated for the year of 1996. Therefore, also in this case a presentation in detail was abandoned.

\(^{36}\) In an overall model producing a convincing explanation (corrected $R^2 = 0.73$) the standardized partial regression coefficient of the regime type variable reaches a value of 0.02 and thus an only very small and not significant result in favor of democratic countries.

\(^{37}\) On the other hand, great wealth of fossil resources, which is characteristic for many countries classified as monarchies, seams to decelerate improvement efforts in these fields.

\(^{38}\) This is surprising especially in the context of the provision of safe internet servers given that one could suppose that the possibility to communicate and to exchange information via Internet is vitally important for democratic communities.

\(^{39}\) See on this also the considerations in Lafferty 2006.

\(^{40}\) This connection surprising in the first moment can be explained with the help of Wagner’s law stating that public spending increases in case of a rising stage of development (Schmidt and Osheim 2007a, p. 32).
country has a huge number of energy resources at its disposal and thus is less dependent on energy imports\textsuperscript{41}.

Whereas the presented institution and actor theories might have difficulties with explaining the missing democracy effect on the economic level, considerations of system theory might be a key to understanding. The economic sustainability performance (outcome legitimization) seems to be eminently important for the regime stability especially of autocracies with weak input legitimization. This fact might explain why in contrast to numerous democracies especially autocracies with a strong economic development demand (China, Russia or Singapore) make special efforts in this context\textsuperscript{42}.

However, the situation is different in regard to the social sustainability dimension. A significantly positive democracy effect on the overall index (Table 4; column 2) can be detected in this case\textsuperscript{43}, even if its explanatory power is again weaker than the one in the context of rule of law. A stable constitutional foundation seems to be very important for the provision of basic needs. This can be shown by the models of the primary school graduation quota (Table 5; column 5) and of the life expectancy of newborns (Table 5; column 7). In contrast to this, its importance for the successes in the tertiary education sector (Table 5; column 6) based on higher number of more profound premises decreases considerably. On the other hand the demographic component does not influence only the overall index, but also all other included indicators of social sustainability. In this connection aging societies seem to stress particularly the socio-political development of their countries\textsuperscript{44}. Whereas there is a negative correlation between economic stage of development and social sustainability performance when controlled for other factors, the opposite seem to be the case as to the wealth in resources of a country.

\textsuperscript{41} There is also a slightly negative correlation between the degree of openness of an economy and the degree of indebtedness.
\textsuperscript{42} The little number of veto players in these countries might tend to facilitate such a (one-dimensional) strategy of performance optimization.
\textsuperscript{43} In an overall model producing good explanation (corrected $R^2 = 0.63$) the standardized partial regression coefficient of the regime type variable reaches a value of 0.13 on a significance level of 90%.
\textsuperscript{44} In any case, it is not possible to find evidence of the hypothesis of redistribution effects which would be disadvantageous for future generations in aging societies.
Table 4: Regressions of the goal dimension of economic, social and environmental sustainability

<table>
<thead>
<tr>
<th>Goal Dimension</th>
<th>Economic Sustainability</th>
<th>Social Sustainability</th>
<th>Environmental Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-0.39*** (0.18)</td>
<td>-1.16*** (0.25)</td>
<td>-0.09 (0.26)</td>
</tr>
<tr>
<td>Regime Type</td>
<td>0.03 (0.11)</td>
<td>0.02</td>
<td>0.24* (0.16)</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>0.01*** (0.01)</td>
<td>0.58</td>
<td>-0.01* (0.01)</td>
</tr>
<tr>
<td>Energy imports</td>
<td>0.01 (0.01)</td>
<td>0.05</td>
<td>-0.01** (0.01)</td>
</tr>
<tr>
<td>Age of regime</td>
<td>0.01 (0.01)</td>
<td>0.10</td>
<td>0.01 (0.01)</td>
</tr>
<tr>
<td>Rule of Law</td>
<td>0.17** (0.08)</td>
<td>0.23</td>
<td>0.29*** (0.11)</td>
</tr>
<tr>
<td>Military Dictatorship</td>
<td>-0.04 (0.13)</td>
<td>-0.02</td>
<td>-0.04 (0.18)</td>
</tr>
<tr>
<td>Monarchy</td>
<td>-0.36 (0.19)</td>
<td>-0.11</td>
<td>0.43* (0.27)</td>
</tr>
<tr>
<td>Population Aging</td>
<td>0.01 (0.01)</td>
<td>0.04</td>
<td>0.11*** (0.01)</td>
</tr>
<tr>
<td>Openness of economy</td>
<td>-0.01 (0.01)</td>
<td>-0.02</td>
<td>0.01** (0.01)</td>
</tr>
<tr>
<td>R²</td>
<td>0.75***</td>
<td>0.66***</td>
<td>0.38***</td>
</tr>
<tr>
<td>Corrected R²</td>
<td>0.73</td>
<td>0.63</td>
<td>0.33</td>
</tr>
</tbody>
</table>

One asterisk represents a significance of 90%, two asterisks - 95% and three asterisks represent a significance of 99%. In the left field for each variable is the partial regression coefficient together with (in parentheses) the relative standard error. The right field contains the standardized partial regression coefficient. All models were checked for heteroscedasticity (Goldfeld/Quandt-Test), autocorrelation (Durbin/Watson Test), multicollinearity (Variance Inflation Factor) and a non-normal distribution of outlying factors. N in all models = 126.
If one tries to explain the positive correlation between degree of democratization and social sustainability, with the help of theoretical approaches, system-, institution- and actor- related argument can be used. Apart from the broad competence of considering interests across numerous social groups (great “winning coalition”) the little inclination to repression and the higher institutional stability might be the deciding argument in favor of democratic countries.

An even clearer regime effect in the expected direction (see hypothesis 3) can be stated for the ecological sustainability dimension. Its robustness cannot only be seen in a highly significant result in regard to the overall index (Table 4, column 3), but it is also indicated by all included single indicators. Thus, in the context of renewable energies (Table 5; column 9) and the efficient use of resources (Table 5; column 10), no one of the other regarded variables can contribute significantly to the explanation. This shows the special meaning of the democratization in this case. In the context of the firstly analyzed ecological performance indicator the degree of CO\textsuperscript{2} emissions of a country (Table 5; column 8) beside the degree of democratization, the stage of economic development plays a significant role. Whereas this factor is positively correlated to the expansion of renewable energies and to resource efficiency in a country (without reaching a significant level), it seems that decoupling economic performance from the level of climate pollution has not been reached until today.

Considering the theoretical preparations, it seems reasonable that the clearly positive correlation between the degree of democratization and ecological sustainability is linked on the one hand to causes explainable by the system theory (facilitation of functional differentiation in the even young field of environmental policy, sensitive feed-back loop in regard to new environmental problems), on the other hand to institutional and actor specific factors. The existing power control mechanisms and the transparency of public processes might raise the ability to correct errors in democracies and thus make it easier to react to ecological problems appropriately. Furthermore,

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45 Whereas the correlation between the regime type and education performance for both included indicators is not significant, a significantly positive connection to the degree of democratization can be detected in regard to the life expectancy of newborns (see on similar results Zweifel and Navia 2000; Jagers 2002 and McGuire 2010).
46 For the last two arguments is the fact that military dictatorships (high repression level) are in a negative and monarchies (institutionally controlled transition rule) in a more positive relation to social sustainability dimension.
47 In an overall model producing acceptable explanation (corrected R\textsuperscript{2} = 0.38) the standardized partial regression coefficient of the regime type variable reaches a value of 0.43 on a significance level of 99%.
48 However, the results are founded on a weak overall model in this case.
49 Furthermore, great wealth of fossil resources, which is characteristic for many countries classified as monarchies, has a negative effect on the climate protection of a country. The factors of rule of law and of the age of a regime, however, still do not have significant explanatory power in the young field of environmental policy.
the broad potential given by considering different interests and the political rights of freedom and participation open up great opportunities to environmental groups. In contrast to this, autocracies seem to have a structural deficit to do so (Wintrobe 2009, p. 388).

6. Implications

In summary, it can be stated that the democracies broadly achieve a better sustainability performance than their autocratic counterparts. A detailed comparison of their performance, however, shows that they are not superior in all respects. Particularly, Democracies are weak in the field of finance consolidation. In addition, the superiority of democracies in infrastructure, research and education is due to an only small group of advanced OECD countries. Beyond this, the assumption of a general superiority of democracies as formulated in hypothesis 1 cannot be confirmed because of sporadic deficits in the ecological sustainability rating.

Corresponding to this, one perceives that the assumed performance differences between regime subtypes (hypothesis 2) are partially so large that they exceed the dichotomies of democracy and autocracy. As predicted by theory and basically explained by varying veto structures, small advantages of parliamentary democracies over presidential democracies can be found within the spectrum of democratic countries. The expected wide performance variation between “successful” monarchies on the one hand and poorly performing military dictatorships on the other hand within the spectrum of autocracies can basically be proven only in the fields of economic and social sustainability.

Hypothesis 3 formulates the expectation that democratic regimes should enjoy a robust and positive effect on their results, even when controlling other factors. But this expectation can only be confirmed in the dimension of environmental sustainability (climate protection, environmental protection and conservation of resources) and, to a lesser degree, in the dimension of social sustainability (increase in life expectancy). Whereas one can see a democracy effect in the “softer” fields such as social sustainability, environmental protection, etc., this effect plays no role in the field of economic performance. The results suggest that autocratic regimes use their

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50 Some autocracies (China, Singapore) succeed in performing, like the well-placed OECD democracies at least in certain fields. The established democracies, however, are better placed across several dimensions than these "successful" autocracies. These autocracies can optimize their performance in only a few (mostly economic) fields, but hardly over the full range of dimensions investigated here.

51 See also the results of Wright 2008 and Knutsen 2010.
significant political capacity for optimizing the performance in those (economic and social) fields that are key to their regime stability (legitimization via outcomes). Reflecting about the environmental dimensions, it seems that the capacity of democracies to satisfy many different interest groups (large winning coalitions) and to achieve a high error correction thanks to its transparency grants it a performance advantage in this case.

The analyses make it obvious that there is not a “regime effect” in all fields. Partly, economic influences (degree of economic development, wealth of natural resources) overlay it\textsuperscript{52}. Another important determinant is the stage of development of a regime's constitutional institutions. It seems that a well-developed rule of law is much more significant in laying the groundwork necessary to meet basic economic and social needs than that of “authentic democratic participation”. Along with regime age, the age structure of a society also plays a unique role, especially when considering sustainable social development.

All in all, the aspects of sustainability present such a differentiated picture that this first attempt could not describe all its facets. This suggests the necessity of further research that not only explores the theoretical connection between regime type and sustainability in more detail, but also seeks for more distinguishing differences between regimes and regime subtypes. Beside detecting further significant explanatory factors of sustainable development (cultural factors, geographic settings, specific actor constellations), research which is more strongly focused on dynamics and change processes (see for the first time series analysis Wurster forthcoming) could prove quite plentiful in this relatively little explored field of research.

7. Appendix

\textsuperscript{52} Thus a high level of economic development has a positive effect on economic sustainability performance. On the other hand, it seems to some extent to impede good performance results in environmental terms.
Table 5: Regressions of the goal indicators of economic, social and environmental sustainability

<table>
<thead>
<tr>
<th>Goal indicators</th>
<th>Finance consolidation</th>
<th>Quality of infrastructure</th>
<th>Research performance</th>
<th>Elementary education</th>
<th>Further education</th>
<th>Life expectancy</th>
<th>CO2-Emissions</th>
<th>Environment protection</th>
<th>Preservation of resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>99.4*** (25,51)</td>
<td>-1.56 (34,19)</td>
<td>0.01 (0.01)</td>
<td>62.02*** (7,54)</td>
<td>-3.95 (6,79)</td>
<td>54.89*** (3,05)</td>
<td>1.65 (150)</td>
<td>-1.50 (7,74)</td>
<td>4.70*** (1,05)</td>
</tr>
<tr>
<td>Regime Type</td>
<td>-1.89 (15,07)</td>
<td>8.14 (20,20)</td>
<td>0.02</td>
<td>-0.01</td>
<td>-0.01</td>
<td>2.61 (4,46)</td>
<td>0.06</td>
<td>3.17 (4,05)</td>
<td>0.06</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>0.01* (0.01)</td>
<td>0.01*** (0.01)</td>
<td>0.49</td>
<td>0.01*** (0.01)</td>
<td>-0.01*** (0.01)</td>
<td>-0.50</td>
<td>-0.10</td>
<td>-0.11</td>
<td>0.01*** (0.01)</td>
</tr>
<tr>
<td>Energy imports</td>
<td>0.09* (0.05)</td>
<td>0.09 (0.06)</td>
<td>0.08</td>
<td>0.01** (0.01)</td>
<td>0.09</td>
<td>-0.04*** (0.02)</td>
<td>-0.24</td>
<td>-0.02* (0.01)</td>
<td>-0.11</td>
</tr>
<tr>
<td>Age of regime</td>
<td>-0.25 (0.30)</td>
<td>2.37*** (0.42)</td>
<td>0.42</td>
<td>0.01*** (0.01)</td>
<td>0.18</td>
<td>6.42* (3.56)</td>
<td>0.29</td>
<td>4.05 (3.19)</td>
<td>0.15</td>
</tr>
<tr>
<td>Rule of Law</td>
<td>-3.63 (10,76)</td>
<td>17.53 (15,90)</td>
<td>0.10</td>
<td>0.01* (0.01)</td>
<td>0.14</td>
<td>6.42* (3.56)</td>
<td>0.29</td>
<td>4.05 (3.19)</td>
<td>0.15</td>
</tr>
<tr>
<td>Military Dictatorship</td>
<td>-24.3 (27,01)</td>
<td>-18.84 (27,89)</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-11.69*** (5.79)</td>
<td>-0.18</td>
<td>1.09 (5.21)</td>
<td>1.46 (2.30)</td>
<td>-1.11 (1.12)</td>
</tr>
<tr>
<td>Monarchy</td>
<td>-8.99 (25,35)</td>
<td>-9.99*** (36,4)</td>
<td>-0.14</td>
<td>0.01*** (0.01)</td>
<td>-0.13</td>
<td>4.08 (8,05)</td>
<td>0.05</td>
<td>0.44 (7,21)</td>
<td>9.65*** (3.29)</td>
</tr>
<tr>
<td>Population Aging</td>
<td>-2.82* (1.51)</td>
<td>-2.45 (2.03)</td>
<td>-0.08</td>
<td>0.01 (0.01)</td>
<td>0.08</td>
<td>2.19*** (0.47)</td>
<td>0.55</td>
<td>3.77*** (0.41)</td>
<td>1.05*** (0.18)</td>
</tr>
<tr>
<td>Openness of economy</td>
<td>-0.51** (0.25)</td>
<td>-0.81** (0.40)</td>
<td>-0.10</td>
<td>0.01 (0.01)</td>
<td>-0.03</td>
<td>0.22** (0.09)</td>
<td>0.20</td>
<td>0.10 (0.08)</td>
<td>0.06* (0.04)</td>
</tr>
<tr>
<td>R²</td>
<td>0.16*</td>
<td>0.81***</td>
<td>0.87***</td>
<td>0.44***</td>
<td>0.72***</td>
<td>0.60***</td>
<td>0.66***</td>
<td>0.14*</td>
<td>0.32***</td>
</tr>
<tr>
<td>Corrected R²</td>
<td>0.04</td>
<td>0.79</td>
<td>0.86</td>
<td>0.40</td>
<td>0.70</td>
<td>0.57</td>
<td>0.63</td>
<td>0.06</td>
<td>0.25</td>
</tr>
<tr>
<td>N</td>
<td>103</td>
<td>120</td>
<td>126</td>
<td>116</td>
<td>119</td>
<td>126</td>
<td>125</td>
<td>103</td>
<td>108</td>
</tr>
</tbody>
</table>

One asterisk represents a significance of 90%, two asterisks - 95% and three asterisks represent a significance of 99%. In the left field for each variable is the partial regression coefficient together with (in parentheses) the relative standard error. The right field contains the standardized partial regression coefficient. All models were checked for heteroscedasticity (Goldfeld/Quandt-Test), autocorrelation (Durbin/Watson Test), multicollinearity (Variance Inflation Factor) and a non-normal distribution of ouiting factors.
8. Literature


