Sustained Economic Growth: Do Institutions Matter, and Which One Prevails?

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In 1965, the growth rate of per capita GDP in Niger and Nigeria was 2.1 percent and 4.2 percent, respectively, and 2.9 percent in Botswana. From 1966 to 1969, however, Niger and Nigeria recorded a negative growth rate, while Botswana continued to experience a positive growth rate over the same period. In 1990, the growth rate of per capita GDP was 1 percent in Ghana and 5.2 percent in Nigeria. Yet, from 1991 to 1994, the growth rate was negative in Nigeria and positive in Ghana. Why does the trajectory of economic growth episodes differ among countries? In other words, why is economic growth more sustainable in some countries than in others?

There are at least two policy-relevant justifications for answering these questions. First, durable poverty reduction requires sustained economic growth. Second, in the absence of sustained growth, policymakers constantly reexamine their policies. In this situation, private investors also continually reexamine their investment projects, which increases the risk of poor economic performance. Thus, policymakers need to identify a framework that allows them to make economic

growth sustainable as soon as they succeed in generating it.

The thesis that I propose in this article is that sustained economic growth (SEG) requires "good" institutions. By "good" institutions I mean those institutions that guarantee private investors relatively lower costs for their investments and ensure that private investors appropriate the fruit of their investments. Good institutions enable private investors to take advantage of favorable business opportunities. Indeed, private investors prefer lower costs for their investments, since this allows wealth creation. They also want to be able to reap a significant share of the return of their investments when they invest. These two conditions are satisfied by the presence of good institutions. In the absence of good institutions, investors may pass on favorable business opportunities, reducing the probability of sustained economic growth.

Rodrik (2005) also argues that good institutions are necessary for SEG. The first objective of this article is to empirically test this assumption and to identify the most important institutions for SEG. To do so, I analyze the combined, separate, and simultaneous effects on SEG of democratic, private property rights, and economic regulatory institutions. The second objective of this article is to identify the mechanisms by which good institutions could affect SEG. In this case I suggest that good institutions, through their favorable effects on private investment, involve an increase in total factor productivity (TFP) that increases economic competitiveness, which is necessary for SEG.

This article tackles the general question of the role of institutions for economic performance, treated by Acemoglu, Johson, and Robinson (2001) and Hall and Jones (1999) among others. Contrary to those authors who are interested in the effect of institutional quality on the level of per capita income, in this article I am interested in the effect of institutional quality on SEG, which seems to be one of the best measurements of economic performance. Indeed, the more a country's economic growth is sustainable, the higher its per capita income will be, especially when the growth rate is strong. SEG is thus the necessary input for the determination of a country's income level, which is determined by both the rate and the sustainability of economic growth.

By focusing on SEG, I also take into account Pritchett's (2000) claim that economies experience various phases of growth over time and that by calculating the average of growth rates over a long period, scholars lose useful information. As a result, while analyzing SEG I do not calculate average growth rates over a long period, but I

observe the evolution of growth rates over five consecutive years and I investigate whether the durability of economic growth episodes could be due to institutional quality.

Empirically, this article builds on recent studies by Hausmann, Pritchett, and Rodrik (2004, 2005) and Jerzmanowski (2006). While these authors are interested in the changes of economic growth regimes, this article is interested in the durable character of growth, regardless of whether or not this growth characterizes a change in economic growth regimes. Hausmann et al. focus on political institutions and find a positive and significant effect of these institutions on growth accelerations. Jerzmanowski, however, concentrates on economic institutions and finds a positive and significant effect of economic institutions on the occurrence of favorable and sustained changes in growth regimes. This article reconciles the approaches followed by Hausmann et al. and Jerzmanowski by testing the effect on SEG of a composite index of political and economic institutions. Also, contrary to previous studies, my analysis examines the mechanisms of transmission of the effect of institutions on SEG. Lastly, to my knowledge Hausmann et al. and Jerzmanowski do not tackle the endogeneity issue in their articles, whereas I try to overcome this kind of shortcoming by using the generalized method of moments (GMM) method of Blundell and Bond (1998).

The remainder of the article is organized as follows. Section 2 presents the various characteristics of SEG from 1960 to 2003. Section 3 expounds the theoretical arguments of this article, while section 4 is devoted to empirical analysis. Section 5 presents the results and section 6 concludes.

Characteristics of Sustained Economic Growth

Looking at Table 1, it appears that SEG over the period 1960–2003 is not a rare phenomenon. Indeed, the probability of a representative country in my sample to experience sustained growth during this period is 0.36. Yet, the probability of high sustained growth is only 0.21 during the same period, suggesting that sustaining high economic growth rate is relatively more difficult.[1]

[1]The computation of these probabilities is carried out by supposing on average that each five years 110 countries have the necessary observations to judge their SEG. With nine subperiods of five years, the total number of SEG possibilities is 990. To obtain the periodic probabilities, I divide the number of countries having experienced sustained growth by the number of countries likely to experience sustained economic growth during a given period.

TABLE 1
CHARACTERISTICS OF SUSTAINED ECONOMIC GROWTH FROM 1960 TO 2003

Probabilities of Economic Growth Sustainability[a]

Periods	Countries[b]	Total Countries[c]	Periodic Probability[d]	Probability DC[e]	Probability UDC[f]	Probability SSA[g]	Probability LAC[h]	Probability ASP[i]	Probability ME[j]	Probability ECE[k]
1961–64	44	94	0.47	0.75	0.37	0.22	0.40	0.60	0.29	—
1965–69	44	97	0.45	0.88	0.31	0.21	0.36	0.53	0.00	1.00
1970–74	43	100	0.43	0.67	0.34	0.24	0.40	0.53	0.00	1.00
1975–79	24	104	0.23	0.18	0.25	0.08	0.20	0.47	0.44	1.00
1980–84	26	112	0.23	0.35	0.19	0.11	0.00	0.60	0.19	0.50
1985–89	38	114	0.33	0.69	0.20	0.14	0.20	0.40	0.09	0.33
1990–94	26	120	0.22	0.17	0.24	0.07	0.28	0.60	0.20	0.00
1995–99	53	121	0.44	0.72	0.32	0.38	0.20	0.40	0.27	0.40
2000–03	58	121	0.48	0.69	0.39	0.41	0.16	0.47	0.45	1.00
Total	356									

Probabilities of High Economic Growth Sustainability[l]

Periods	Countries	Total Countries	Periodic Probability	Probability DC	Probability UDC	Probability SSA	Probability LAC	Probability ASP	Probability ME 1	Probability ECE
1961–64	29	94	0.31	0.58	0.21	0.13	0.20	0.33	0.29	—
1965–69	29	97	0.30	0.56	0.21	0.13	0.16	0.47	0.00	1.00

1970–74	27	100	0.27	0.41	0.22	0.16	0.32	0.20	0.00	1.00
1975–79	17	104	0.16	0.18	0.16	0.04	0.04	0.40	0.33	1.00
1980–84	13	112	0.12	0.06	0.14	0.11	0.00	0.47	0.00	0.50
1985–89	22	114	0.19	0.41	0.11	0.07	0.04	0.33	0.00	0.33
1990–94	14	120	0.12	0.06	0.14	0.03	0.08	0.53	0.10	0.00
1995–99	25	121	0.21	0.31	0.16	0.14	0.12	0.40	0.09	0.00
2000–03	29	121	0.24	0.28	0.22	0.28	0.00	0.33	0.09	1.00
Total	205								

[a]I define sustained economic growth as a positive growth of per capita GDP during five consecutive years. My sample is composed of 123 countries, and among those are 85 developing countries and 38 developed countries. Unfortunately, all the countries do not have sufficient data at each period to judge the sustainability of their economic growth episodes. Data on growth rates are from World Bank (2005)—*World Development Indicators*, database.

[b]This is the number of countries having experienced positive economic growth during five consecutive years.

[c]Denotes the total number of countries for which I have a sufficient number of observations to draw conclusions about the sustainability of their economic growth during a given period.

[d]The periodic probability of economic growth sustainability is calculated as the ratio of the number of countries having experienced sustained growth to the total number of countries for which I have sufficient observations to judge the sustainability of their growth during a given period.

[e]Denotes the probability for a developed country—according to the World Bank classification—to experience sustained growth during a given period. This probability is calculated in the same manner as in the general case mentioned above.

[f]Denotes the probability for a developing country to experience sustained growth. The ex-communist countries of Europe not classified by the World Bank are also regarded as developing countries.

[g, h, i, j, k]Respectively denotes the probability for a sub-Saharan African, Latin American/Caribbean, Asian/Pacific, Middle Eastern/North African, and Eastern/Central European country to experience sustained growth during a given period. The value of 1 for Eastern and Central European countries is not surprising because the available data for this region are generally from Latvia, which recorded positive economic growth. It is only at the end of period that the available data from this region increase.

[l]By high economic growth, I mean an annual growth of GDP per capita of at least 2 percent observed during five consecutive years. I choose the threshold of 2 percent because Hausmann, Pritchett, and Rodrik (2004, 2005) argue that it is the rate at which an economy should grow to converge toward that of the industrialized countries.

For the whole sample, the period preceding the oil crises of the late 1970s and early 1980s is most favorable for SEG. During the oil crises, the probability of SEG in a country in my sample is reduced almost by half relative to the previous period. Soon after the oil crises, the number of countries having experienced sustained growth immediately increased, before diminishing during the first five years of the 1990s. At the end of the 1990s, the probability of SEG reached again its value of the period preceding the oil crises, whereas it was not the case for high SEG.

This overall picture of the evolution of SEG masks differences among groups of countries. Indeed, although the period preceding the oil crises is more favorable for SEG for all the countries, it appears that a developed country generally is more likely to experience sustained growth than a developing country. Moreover, the trajectory of the probabilities of SEG in developed and developing countries reveals differences which are especially stark after the oil crises.

In developed countries, the five-year term following the oil crises was marked by an increase in the number of countries having experienced sustained growth, whereas the period 1990–94 was marked by a reduction in this number. Thus, developed countries quickly recovered from the oil crises, but their recovery was not durable because of disturbances in European financial and exchanges markets in the late1980s and early 1990s, as well as the Gulf War. During the last two five-year terms, the probability of SEG in developed countries reached its value of the period preceding the oil crises, but we can observe a small decline in the value of this probability during the last five-year term.

In developing countries, the recovery from the oil crises was not immediate and did not take place until 1990–94. This recovery was incremental and improved during the last five-year term, when the probability of SEG reached the same value it held during the period preceding that of the oil crises. Thus, there is a difference in the cycles of SEG of developed and developing countries. Even among developing countries, however, there also are differences in the cycles of SEG.

The countries in Asia and the Pacific, compared to the other developing countries are atypical in terms of SEG, because in general the probability of SEG for countries in Asia and the Pacific is always higher than that of the representative country of my sample.

The evolution of SEG probability for North African and Middle Eastern countries shows that for this group of developing countries, the most favorable period for SEG was that of the first oil crisis. In this region, the recovery from the second oil crisis was delayed and undertaken in incremental way. There was a clear improvement in the probability of SEG during the last five-year term, especially due to the performance of North African countries.

In sub-Saharan Africa, the last two five-year terms were the most favorable period for SEG. It is possible that this is the materialization of the effects of economic reforms such as structural adjustment, and the devaluation of the CFA franc, as well as the beginning of democratization in sub-Saharan Africa during the 1980s and 1990s. The cycle of SEG immediately following the oil crises in sub-Saharan Africa is similar to that of developed countries, which to a certain extent, reflects the tight connection between this region's economies and those of developed countries. Indeed, the upturn of economic activities in sub-Saharan Africa following the second oil shock stopped five years later, just as in developed countries.

In Latin America and the Caribbean, the period preceding the oil crises was most favorable for SEG. The region's growth was marred by the second oil shock, during which time none of the countries in this region experienced SEG. In Latin America and the Caribbean, the recovery from the oil crises was immediate and was characterized by the increase in the value of the probability of SEG during the first decade after the second oil shock. This economic upturn stopped from 1995 to 1999 because of the financial crises that hit Latin American economies. The levelling-off of the economic upturn was especially felt in terms of high sustained growth. Indeed, during the last five-year term no country of this region experienced high sustained economic growth.

 In Central and Eastern Europe, the last five-year term following the oil crises was most favorable for SEG. This situation could be considered as the manifestation of positive effects of the reforms introduced in this region at the beginning of the 1990s.

It appears that from 1960 to 2003, developed countries were more likely than underdeveloped countries to experience sustained growth. Table 1 illustrates this trend and invites an analysis of the effect of institutions on SEG, since, on average, the quality of institutions in developed countries is better than those in developing countries.

Theoretical Arguments of "Good" Institutions' Effects on Sustained Growth

Rodrik (2005) contends that sustaining economic growth differs from igniting it, and according to Rodrik, sustained economic growth requires good institutions. I argue that an economy experiences a sustained growth when it is competitive.[2] An economy that is not competitive is likely to experience unsustained growth because of an increase in its imports or a drop in its exports. One good way for an economy to be competitive is to increase its total factor productivity, thanks to its institutional quality. Thus, good institutions, while reducing government failures, contribute to the development of private investment. Because of the "learning-by-doing" effect that Romer (1986) highlights, the increase in private investment involves an increase in TFP.[3] Therefore, TFP is doubly endogenized since it depends on the accumulation of private investment, which in turn depends on the institutional quality.

I argue that good institutions favor the development of private investment by increasing private investments' return. They do this by reducing investment costs and by guaranteeing private investors receive a significant share of their investments' return. Indeed, no increase in private investment is possible if private investors are not guaranteed to make profits and to get a significant share of these profits back when they do invest.

However, the existence of good institutions may not be sufficient to boost private investment. Business opportunities also must be favorable. These favorable business opportunities include, among other things: the level of demand on national and international markets, favorable terms of trade, and a competitive real exchange rate. For private investors all these opportunities result in concrete terms in economic growth rates. A positive (negative) growth rate reflects the existence (absence) of good opportunities.

When private investors react to favorable opportunities by increasing their investments, there is an increase in TFP, an improvement in economic competitiveness, and SEG. Importantly, however,

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[2]This is one of the assumptions of my theoretical reasoning. I do not call into question the positive effect of economic competitiveness on the level of economic growth as is often asserted in the literature, but I argue that increasing economic competitiveness can also be a source of economic growth sustainability.

[3]Institutions also can affect the level of an economy's competitiveness by their favorable effect on technological adoptions and innovations. See Acemoglu, Aghion, and Zilibotti (2004); Acemoglu and Robinson (2006); Scarpetta and Tressel (2002); and Parente and Prescott (1994).

the reaction of private investors to the favorable opportunities depends on the quality of institutions. As a result, not all favorable opportunities are seized by private investors. Only opportunities in the presence of good institutions can be seized.

Institutions for Sustained Growth and the Reduction of Private Investment Costs

When private investors decide to invest, they aim to maximize their profits by minimizing the cost of their investments. In an economy, private investors face various investments costs, but I identify three specific kinds of these costs: costs of distortionary macroeconomic policies, costs of new enterprise creation, and costs of achievement of economic and financial transactions. These three kinds of costs do not depend on private enterprises and are imposed on them by policy-makers, and the amount of these costs depends on the country's institutional quality. Hence, I focus my theoretical reasoning on the institutions most likely to determine these costs.

Democracy Reduces the Likelihood of Distortionary Policies

Democratic institutions are likely to assure private investors lower costs related to distortionary policies (e.g., high inflation, high deficit), because democratic governance reduces the probability of implementing such distortionary policies.[4] The role of democracy for policies' quality can well be understood in the context of developing countries, where distortionary policies are implemented because of socio-political factors and weak political institutions. Indeed, in poor countries where the leaders have the decision making power and are not subject to any political or institutional constraints, these leaders

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[4]By suggesting that democracy reduces the risk of undertaking distortionary policies, my argument is consistent with many scholars who defend the benefits of democracy for the choice of good policies. In this domain, however, scholars' opinions diverge. On the one hand, authors like Nordhaus (1975) argue that democracy can involve distortionary policies in the short term because of electoral considerations. In the same vein, Barro and Gordon (1983) note that temporal inconsistencies highlight the risk of inflation in democratic regimes. On the other hand, authors like Wittman (1989, 1995) and Baba (1997) show that the more a political regime is democratic, the more the process and the choice of policies are transparent, so the risk of undertaking policies which aim to serve leaders' personal interests is reduced. My argument concerning democracy is most similar to those of Wittman (1989, 1995) and Baba (1997). Barro (1996) reconciles the two possible effects of democracy on economic performance by showing a nonlinear relation between democracy and economic growth.

undertake socially inefficient economic policies to become wealthy, enrich their partisans, and ensure that they remain in office. Bates (1981) puts forward this argument for African countries in general, and for Ghana in particular. Bevan, Collier, and Gunning (1999) document the case of Nigerian political leaders, and Acemoglu et al. (2003) illustrate the case of Argentinean political leaders and those of other Latin American countries.

In a sample of developed and underdeveloped countries, Satyanath and Subramanian (2004) empirically show that democracy is the most robust determinant of macroeconomic stability in the long term. Hamann and Pratti (2002) show that of 51 episodes of successful inflation stabilization, democracy is one of the factors contributing to the successful inflation stabilization. Acemoglu et al. (2003) demonstrate that distortionary policies, economic crises, and slow economic growth are due to the weakness of political institutions.

Regulation of Economic Activities

When the costs of new enterprise creation and the achievement of economic and financial transactions are too high, they constitute an obstacle to the development of private investment. It follows, then, that these costs can prevent SEG. I argue that efficient economic regulation is necessary for SEG. By efficient economic regulation, I mean regulation that reduces government and market failures while assuring that the markets function without distortions. Thus, efficient regulation should reduce the protections granted to the least efficient enterprises, while supporting the entry into the market of dynamic and innovative investors. Likewise, efficient regulation should guarantee lower transaction costs and consequently increase the returns of investment for private enterprises already present in the market.

By arguing that efficient economic regulation is necessary for the development of private investment, my argument is consistent with the hypotheses supported by Stigler (1971), McChesney (1987), De Soto (1990) as well as "public choice theory" of regulation.[5]

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[5]In contrast, Pigou (1938) in line with the "public interest theory" of regulation supports the need of government intervention in the form of strong regulation of economic activities in order to ensure a good market functioning. For a presentation and a test of various theories of regulation, see Djankov et al. (2001, 2002).

Nicoletti and Scarpetta (2006) show that a flexible regulation of product markets in OECD countries favors the development of domestic and foreign investments in these countries. Likewise, Besley and Burgess (2004) show that the Indian states that amended the regulation of the labor market in favor of workers are those that experience a slow growth of investment in the formal manufacturing sector. Many other studies show that differences in the regulation of the labor market explain differences in economic performances among OECD countries (see Freeman 1988, Blanchard 2003, and Nickell and Layard 2000).

Private Property Rights Protection for Sustained Economic Growth

When private investors decide to invest, they are concerned with the amount of wealth they will create on the one hand, and with the possibility to reap a significant share of this wealth, on the other. If these two conditions are not satisfied, there is likely under-investment. Institutions ensuring the protection of private property rights are necessary for the development of private investment and SEG. The assured protection of property rights mitigates investors' concerns about reaping the fruit of their investments (Demsetz 1967, Alchian and Demsetz 1973, North and Thomas 1973, North 1981, and Jones 1981).

In a study of two villages in Ghana, Besley (1995) finds that the protection of land property rights increases the rate of investment of farmers. Likewise, Johnson, McMillan, and Woodruff (2002) show that the protection of private property rights is a necessary and sufficient condition for the development of private investment in ex-communist European countries. Svenson (1998) shows that in an environment of political instability and social polarization, political leaders have little incentive to ensure the protection of private property rights, and in such situations, private investment is less developed.

As such, I contend, like Rodrik (2005), that good institutions are necessary for SEG. Good institutions reduce the costs of private investment and guarantee private investors the appropriation of a substantial portion of the return of their investments. Thus, good institutions are necessary for an increase in private investment and TFP. The increase in TFP induces a gain of economic competitiveness, which in turn is necessary for SEG. My theoretical reasoning can be schematically summarized as follows:

395

"Good" Institutions → Increase in Private Investment → Increase in Total Factor Productivity → Economic Competitiveness Gain → Sustained Economic Growth

This theoretical reasoning implies the following chronology of events:

1. At time t, private investors in a country observe the economic growth rate. If the growth rate is positive, this reveals favorable business opportunities for private investors.
2. Private investors take into account the level of institutional quality before deciding to seize these favorable opportunities. They must be sure that the institutions in place enable them to make a profit and to reap a significant share of this profit.
3. When private investors decide to seize favorable opportunities by increasing their investments, they positively affect total factor productivity and economic competitiveness levels. By doing so, the probability of SEG increases.

Empirical Strategy

Description of Variables

My hypothesis suggests that good institutions are necessary for SEG. These institutions are economic as well as political. My theoretical reasoning requires me to test the combined effect on SEG of political and economic institutions. Thus, I test the effect on SEG of an index that I call index of politico-economic institutions. This index is a composite index of economic institutions indexes (e.g., regulation and private property rights indexes) and an index of democratic political institutions. The composite index is a proxy for private investors' apprehensions relating to the costs of their investments and the appropriation of their investments' return. A high value of the politico-economic institutions index indicates a high overall institutional quality and fewer apprehensions on the part of private investors. The composite index is an equal addition of regulation, property rights and democracy indexes. The use of equal weights for the composite index allows a neutral aggregation of the various institutional indexes.

The regulation and property rights indexes are from the Fraser

Institute and cover the years from 1970 to 2003.[6] The values of these indexes are provided every five years until 2001, at which point their annual values become available. I compute the average values of these indexes from 2001 to 2003 to complete my data. The regulation index measures the regulation of credit markets, labor markets, and business. The property rights index measures the levels of rule of law and property rights enforcement. The respective value of both indexes varies between 0 and 10; a high value corresponds to an institution of high quality (i.e., good protection of property rights and freedom to undertake economic activities).

To measure democratic institutions, I use the political rights index from Freedom House. This index measures citizens' participation in the political process, including the right to vote, to compete for official posts, and to elect representatives who have a decisive impact on public policies and are accountable to the electorate. The value of this index varies between 1 and 7, with a high value indicating lower quality of democratic institutions. I take the reverse of the values of the democracy index so that a high score is assigned to the more democratic countries. The democracy index dates from 1972 to 2003. I compute the average values of the democracy index in five-year intervals from 1975 to 2003. In order to reduce the number of missing observations, I consider the value of the index in 1972 as its average value for the first five-year term of the 1970s, and the average value over the 1973–1974 period, as its average value for the second five-year term of the 1970s.

Lastly, I measure the dependent variable—sustained economic growth (SEG)—as the per capita GDP positive growth rates over five-year intervals from 1960 to 2003. Thus, a country is considered to have experienced sustained economic growth if its economic growth rate is positive during five consecutive years. In this case, the dependent variable takes the value of one. Even for one year of negative growth over five years, however, a country's economic growth is considered as unsustained, and in this case the dependent variable takes the value of zero. As such, the dependent variable is a binary variable.

[6]The Fraser Institute provides a composite index called index of economic freedom. This index is an equal addition of five elements. These five elements are: size of government, legal structure and property rights security, access to sound money, freedom to trade internationally, and regulation of economic activities. I prefer to consider only two components of this index because they better measure the institutional aspect that interests me and because I want to avoid assimilating some macroeconomic policy variables to institutions.

Specification of the Models

I choose to examine five-year intervals because of the availability of the data on economic institutions, which generally are provided every five-year period. While indeed, there are other databases on economic institutions, the Fraser Institute's index is most appropriate for my paper. First, the Fraser Institute database has a long temporal dimension going back to the 1970s. To my knowledge, it is the only database on economic institutions with this temporal depth currently available. Second, this database contains the economic institutions indexes that I need to test my various theoretical arguments.

Even if the arbitrary character for the duration of SEG definition can be justified, giving a value of zero to the explained variable for a country that has just experienced one or two years of negative growth despite a good performance during the other years can be considered as another limit of my model. To overcome this potential shortcoming, I control for temporal fixed effects. In this case, I ensure that SEG cannot be explained by covariant shocks simultaneously affecting all the countries in my sample.[7] Likewise, I control for country fixed effects. By doing so, I control for any unobservable characteristics of a country that could otherwise affect SEG. Thus, the model I estimate is as follows:

(1) $\text{Prob}_{it} \ [(g_{i0}...g_{i4}) > 0 \mid (c, \text{index}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t)] = G \ (c, \text{index}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t)$

Prob_{it} measures the probability of a country experiencing sustained economic growth. We also can understand this as the probability that a country experiences positive growth of per capita GDP over five consecutive years. Index_{it} stands for the value of the politico-economic institutions index in country i at time t. Tfp_{it} measures the level of total factor productivity in country i at time t. I use economic growth accounting to compute TFP. Following Easterly and Levine (2002) and Hall and Jones (1999), I assume that the share of physical capital remuneration in GDP is equal to 0.33. I use the human capital data from Barro and Lee (2000) for the computation of TFP. As for the physical capital stock, I compute it using data from

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[7]As an additional robustness check of my results, I also control for terms of trade to take into account the specific shocks affecting each country. In this case, my results do not change. Moreover, as another robustness check, I reduce the durability of economic growth for SEG definition, and my main results are also not affected. Those results are not shown and are available upon request.

World Bank (2005) and by applying the perpetual inventory method. The computation of TFP covers the years from 1960 to 2003.

Privinv$_{it}$ denotes private investment in country i at time t. The private investment data for underdeveloped countries are from Global Development Network Database and cover the period 1970–99. Thanks to data from the World Bank (2005), I derive my own computation of private investment stock for the developed countries of my sample. U$_i$ denotes the country fixed effects, v$_t$ stands for the temporal fixed effects, and c is the constant. G is a linear function or a normal cumulative distribution function, depending on the estimate method used.

The model I initially estimate is the one described above, with a sample of 123 countries including 85 underdeveloped countries, 38 developed countries, and 78 former colonies (see Appendix). Estimating only that model, however, leaves interesting questions unexplored. Indeed, by testing only the effect of the politico-economic institutions index on SEG, I could get a less precise measurement of the effect the various institutions on SEG, since it may be that the effect of the politico-economic institutions index on SEG that I get is actually that of one or two institutions and not the effect of all the institutions in which I am interested. As I mention above, I expect each type of institution to have a positive effect on SEG, so it is necessary to test these various theoretical arguments by testing the separate effect of each institution on SEG. Thus, I also estimate the following models:

(2) $\text{Prob}_{it} \left[(g_{t0} \ldots g_{t4}) > 0 \mid (c, \text{prop}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t) \right] = G\,(c, \text{prop}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t)$

(3) $\text{Prob}_{it} \left[(g_{t0} \ldots g_{t4}) > 0 \mid (c, \text{reg}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t) \right] = G\,(c, \text{reg}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t)$

(4) $\text{Prob}_{it} \left[(g_{t0} \ldots g_{t4}) > 0 \mid (c, \text{dem}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t) \right] = G\,(c, \text{dem}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t)$

(5) $\text{Prob}_{it} \left[(g_{t0} \ldots g_{t4}) > 0 \mid (c, \text{prop}_{it}, \text{reg}_{it}, \text{dem}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t) \right] = G\,(c, \text{prop}_{it}, \text{reg}_{it}, \text{dem}_{it}, \text{tfp}_{it}, \text{privinv}_{it}, u_i, v_t)$

In equations (2), (3), (4), and (5), prop$_{it}$, reg$_{it}$, and dem$_{it}$, respectively, denote the property rights index, the regulation index, and the democracy index in country i at time t. In these equations, the other variables have the same definitions as in equation (1). Equation (1) allows me to estimate the combined effect on SEG of political and economic institutions (i.e., the observed effect when political and economic institutions act on SEG as the one and same institution).

Equations (2), (3), and (4) enable me to estimate the separate effect of each institution on SEG (i.e., the specific effect of an institution while ignoring the effect of the other institutions). As for equation (5), it enables me to estimate the simultaneous effect of the various institutions on SEG (i.e., the observed effects when all the institutions act at the same time but each one with its own effect). By estimating equations (2), (3), (4), and (5), it then becomes possible to identify the most important institutions for SEG.

I identify the most important institutions for SEG through a two-step strategy. First, an institution would be considered as most important for SEG, if its separate effect on SEG is positive and significant, and its effect remains positive and significant despite considering simultaneously the effects of the other institutions. Second, whenever more than one institution meets these two criteria, the most important institution will be identified by comparing the magnitude of the effects of these various institutions on SEG. If only one institution meets the criteria of statistical significance, however, there is no need for comparing the magnitude of the coefficients, since in this case the coefficients of the other institutions are likely to be zero. Acemoglu and Robinson (2005) also use this procedure for the identification of the most important institutions for economic performances.

My empirical strategy has several advantages. First, to my knowledge my paper is unique in studying the effect of institutions on SEG. In general, most empirical analyses examine the effects of institutions on the level of per capita income, growth rate, or on the changes in growth regimes.

Second, my article is one of the few studies that examine the effects of institutions on economic performance with panel data. Indeed, generally, scholars use cross-sectional data because of low temporal variability of institutional indexes, and also because institutions are supposed to be constant over the time. Thus, obtaining a significant effect of institutions on SEG with panel data could be an interesting result because of the advantages of panel data estimations.

Third, my empirical strategy makes it possible to estimate the combined, separate, and simultaneous effects of three institutions on SEG. By testing the combined effect of these institutions, I reconcile two economic approaches of institutional analysis: the approach that privileges political institutions and the approach that privileges economic institutions. The estimation of separate and simultaneous

effects of three various institutions makes it possible to identify the most important institutions for SEG. This constitutes one of the main contributions of my article. Moreover, I test the effects of political institutions and two kinds of economic institutions. This procedure constitutes another of my article's contributions because I avoid reducing institutions to democracy or to the protection of property rights, as it is often done in empirical studies. Lastly, my analysis shows that TFP is one of the channels through which institutions affect SEG.

Methods of Econometric Estimations

While my empirical strategy has several advantages, the reliability of my results requires that I correct for endogeneity. Indeed, if it is possible that good institutions determine SEG, it is also possible that countries that experience sustained growth are also the ones that can offer good institutions. In addition, because of the subjective character of institutional quality measurement, one cannot exclude the possibility that measurement errors in the various indices of institutional quality bias the results. Finally, countries equipped with good institutions also can have other factors favorable for SEG, the omission of which adds another potential layer of endogeneity. Thus, there are three potential sources of endogeneity in my data.

Because I use panel data and most instrumental variables for institutions are constant over time, I do not have suitable instruments to correct for endogeneity. Moreover, as I want to compare the effect of three kinds of institutions on SEG, I need at least three instrumental variables for institutions, which are difficult to find. To solve the endogeneity problem, I resort to the GMM system method of Blundell and Bond (1998). The GMM system is the best tool that I can use for my empirical analysis in this article. Indeed, whatever the origin of endogeneity in my data and the number of endogenous variables, the GMM system allows me to solve the endogeneity problem by using adequately lagged values of the explanatory endogenous variables as instruments.

Nevertheless, the use of GMM techniques in the context of this article presents some problems, as its application to my data and the binary nature of the dependent variable require that I use a linear probability model. In general, when one uses linear probability

models, it is possible that the predicted dependent variable takes values lower than 0 or higher than 1. This is one of the main limits of linear probability models, as the value of a probability is supposed to fall between 0 and 1. It follows that the number of observations for which the predicted explained variable does not fall within the 0–1 interval, must be checked. If for the majority of the observations, the predicted explained variable varies between 0 and 1, the limits of linear probability models relating to the interval of variation is no longer a concern (see Wooldridge 2000, chap. 7).

In addition, I use OLS with pooled data and panel fixed effects technique to estimate my models. The fixed effect model, in the context of this paper, is a linear probability model in which I control for individual and temporal fixed effects, thus reducing the endogeneity problem. The use of OLS and fixed effect regressions can also be considered as a robustness test for the results with the GMM system method, at least for the sign of the coefficients. Moreover, by comparing the results of fixed effect model with those of the GMM system, I can begin to identify the source of endogeneity in my data.

I also use the probit model to run regressions with my panel data. This specification ensures that the predicted value of the explained variable lies between 0 and 1. Yet, the currently available version of the probit model in the STATA statistics package limits its application to random effects by making the strong assumption that country-specific effects and the explanatory variables are independent.[8]

I use four econometric techniques to estimate my models making it possible to test the robustness of my results. Of all the results, those obtained from the GMM system method are most convincing because in this case I control for individual and temporal fixed effects,

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[8]I also apply the logit model with fixed effects to my data. In this case, there is no need to suppose the absence of correlation between the explanatory variables and the individual specific effects. The results are generally similar to those of the probit model with random effects and are available upon request. I prefer to report the results of the estimations by the probit model with random effects together with those of the linear probability models as they are more comparable. Indeed, in the probit model as well as in the linear probability models, the errors are supposed to have the standard normal distribution, whereas in the logit model, the errors are supposed to have the standard logistic distribution. In addition, the use of the logit model with fixed effects is based on conditional probabilities, while excluding the observations for which the probability is always equal to 0 or to 1. This procedure aims to solve the incidental parameter problem. Therefore, the exclusion of certain observations is debatable when using the logit model with fixed effects.

and I also correct for the endogeneity of the various explanatory variables.

Before presenting the results, three remarks are in order. First, my dependent variable covers the period 1960–2003, whereas my institutional indexes data go back to 1970 through 2003, meaning that my data are typically in the form of unbalanced panel data. This characteristic of my data is not a serious problem, however, as the STATA software well manages this kind of data.

Second, the data support the mechanisms through which I argue that institutions affect SEG. Indeed, I obtain a positive and significant effect of the various institutional indexes on private investment on the one hand, and a positive and significant effect of private investment accumulation on TFP on the other. Moreover, it appears that private property rights institutions are more important for private investment accumulation. All these results are not shown but they are available upon request.

Third, consistent with my theoretical arguments, when I estimate the various models only the effect of TFP on SEG should be positive and significant, unless private investment and institutions have independent and distinct (i.e., other than their effect due to TFP) effects on SEG.

Results

The results in Tables 2 and 3 indicate that independently of the estimation method and the specification used, TFP positively and significantly affects the probability of SEG. Thus, the data confirm my hypothesis according to which an increase in TFP is necessary for SEG. The coefficient of TFP in column 3 (GMM system) of Table 2 is 1.205. This is a large effect and implies that a one standard deviation increase in TFP causes about 0.28 increase in the probability of SEG (0.28 = 0.235 x 1.205).

Through Table 2, it appears that for the majority of observations, the predicted value of the probability of SEG lies between zero and one. In this case, the results of linear probability models in general, and those of GMM system in particular, can be considered with fewer reservations. Moreover, the Sargan-Hansen test shows that the lagged values of the endogenous variables that I use as instrumental variables are good instruments.

As for the results of estimation with the probit model, they also

TABLE 2
RESULTS OF COMBINED AND SIMULTANEOUS EFFECTS OF INSTITUTIONS ON SUSTAINED GROWTH CONTROLLING FOR PRIVATE INVESTMENT AND TOTAL FACTOR PRODUCTIVITY EFFECTS

	OLS	Fixed Effect	GMM System	Probit (RE)	OLS	Fixed Effect	GMM System	Probit (RE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Index	0.035 (3.36)***	0.105 (3.93)***	0.057 (1.75)*	0.200 (3.21)***				
Reg					0.019 (0.65)	0.138 (1.98)**	0.280 (1.85)*	0.232 (1.56)
Prop					0.057 (3.11)***	0.093 (2.77)***	0.007 (0.14)	0.256 (2.80)***
Dem					-0.073 (0.68)	0.171 (0.69)	-0.202 (0.52)	-0.316 (0.68)
Privinv	1.380 (3.20)***	-0.118 (0.13)	-0.166 (0.10)	1.399 (0.61)	1.409 (3.28)***	-0.119 (0.13)	1.337 (0.67)	1.549 (0.68)
Tfp	0.369 (3.01)***	0.421 (3.38)***	1.205 (1.91)*	2.774 (4.22)***	0.364 (3.04)***	0.426 (3.39)***	0.664 (1.70)*	2.711 (4.17)***
Constant	-0.213 (1.87)*	-0.436 (1.24)	0.304 (0.74)	-1.238 (1.58)	-0.192 (1.33)	-0.570 (1.33)	-0.875 (1.03)	-1.540 (1.61)

Number of observations	292	292	292	292	292	292	292	292
Number of countries	91	91	91	91	91	91	91	91
Percent of observations[a]	97%	76%	79%		97%	74%	78%	
Sargan-Hansen test[b]			0.884				0.485	
AR (1)[b]			0.002				0.000	
AR (2)[b]			0.624				0.284	
Log of vraisemblance				−133.433				−132.83
Likelihood-ratio test[c]				8.19***				7.49**

***, **, and *, respectively, denote coefficients significant at the thresholds of 1 percent, 5 percent, and 10 percent. The figures in parentheses are robust t-Student. All the estimates (except for those in OLS) contain temporal dummies whose coefficients are not shown.

[a]These figures are the percents of observations for which the predicted value of the probability of SEG lies between zero and one.
[b]These figures are the p-values associated with various tests, and especially they show that the lagged variables that I use as instruments in the GMM system are good instruments.
[c]These figures are χ^2 values of significance test of random effects in the probit model with random effects. When the test is significant this indicates that the probit model with random effects is preferable to the probit model without random effects.

TABLE 3
RESULTS OF SEPARATE EFFECTS OF INSTITUTIONS ON SUSTAINED GROWTH CONTROLLING FOR PRIVATE INVESTMENT AND TOTAL FACTOR PRODUCTIVITY EFFECTS

	OLS			Fixed Effect			GMM System			Probit with Random Effect		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Reg	0.042 (1.72)*			0.113 (1.87)*			0.254 (1.95)*			0.327 (2.46)**		
Prop		0.048 (3.58)***			0.106 (3.55)***			-0.012 (0.27)			0.241 (3.67)***	
Dem			0.134 (1.81)*			0.038 (0.17)			0.104 (0.35)			0.558 (2.02)**
Privinv	1.958 (5.40)***	1.438 (3.72)***	1.798 (5.19)***	-0.216 (0.28)	-0.403 (0.49)	-0.254 (0.35)	-0.755 (0.30)	2.772 (1.02)	3.747 (1.42)	5.067 (2.57)**	1.991 (1.07)	5.510 (3.78)***
Tfp	0.426 (3.84)***	0.376 (3.22)***	0.405 (4.32)***	0.410 (3.91)***	0.374 (2.94)***	0.345 (3.42)***	1.041 (2.49)**	1.488 (1.94)*	0.956 (2.22)**	2.948 (4.95)***	2.423 (4.39)***	2.267 (5.23)***
Constant	-0.134 (1.09)	-0.083 (1.03)	0.063 (1.17)	-0.082 (0.24)	0.186 (1.03)	0.549 (3.49)***	-0.363 (0.60)	0.495 (0.80)	0.072 (0.22)	-2.449 (3.16)***	-0.999 (2.30)**	-0.987 (3.57)***

Number of Observations	335	325	415	335	325	415	335	325	415	335	325	415
Number of countries				96	94	97	96	94	97	96	94	97
Percent of observations[a]	95%	97%	95%	96%	88%	99%	79%	83%	76%			
Sargan–Hansen test[b]							0.309	0.745	0.601			
AR (1)[b]							0.000	0.000	0.000			
AR (2)[b]							0.786	0.504	0.827			
Log of vraisemblance										−152.23	−151.39	−199.40
Likelihood-ratio test[c]										9.26**	4.86**	3.22**

*** , ** , and * , respectively, denote coefficients significant at the thresholds of 1 percent, 5 percent, and 10 percent. The figures in parentheses are robust t-Student. All the estimates (except for those in OLS) contain temporal dummies whose coefficients are not shown.

[a] These figures are the percents of observations for which the predicted value of the probability of SEG lies between zero and one.

[b] These figures are the p-values associated with various tests, and especially they show that the lagged variables that I use as instruments in the GMM system are good instruments.

[c] These figures are χ^2 values of significance test of random effects in the probit model with random effects. When the test is significant this indicates that the probit model with random effects is preferable to the probit model without random effects.

indicate a positive and significant effect of TFP on SEG. It appears that the variance of random effects is very significant in the probit model. Thus, the probit model with random effects is preferable to the probit model without random effects.

The results in Table 2 reveal an independent effect of the politico-economic institutions index on SEG. In fact, it appears that independently of the method of estimation, the politico-economic institutions index positively and significantly affects SEG despite considering the effect of TFP on SEG. The independent effect of the politico-economic institutions index on SEG in GMM system (column 3 of Table 2) is 0.057 and significant at the 10% level. This coefficient implies that a one standard deviation (2.807) increase in the politico-economic institutions index causes an increase of approximately 0.16 in the probability of SEG.

The independent effect of the politico-economic institutions index on SEG can be explained by other positive externalities of institutions on SEG. Indeed, in an environment of good institutions, private investors can trust one another and collaborate together more easily. This would improve the productivity of their investments, their capacities for future investment and, consequently, an increase in the likelihood of SEG. For instance, the collaboration can take the form of credits between private investors who do not reside in the same areas and/or who do not have necessarily any parental relationship. It is not clear whether this kind of collaboration can exist in an environment of "bad" institutions, where mistrust and an asymmetry of information prevail, and where trade is based on geographical proximity or parental relationships (see North 1991).

Let us now try to identify the most important institutions for SEG. The GMM results in Table 3 show that only the separate effect of regulatory institutions on SEG is significant after controlling for the effect of TFP.[9] Likewise, the result in column 7 of Table 2 shows that only the regulatory institutions have a positive and significant effect on SEG despite considering the simultaneous effect of the three various institutions on SEG. As such, the results in Tables 2 and 3 seem to indicate that the most important institutions for SEG are the regulatory institutions. Indeed, only the regulatory institutions meet the

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[9]The bivariete relations between SEG and each of the three various institutions (property rights, democracy, and regulation) are positive, significant, and robust. These results are not shown but are available upon request.

two criteria of statistical significance that I define above, for the iden-
tification of the most important institutions for SEG. Moreover, the
impact of regulatory institutions on SEG is large. The result in col-
umn 7 (GMM) of Table 2 shows that a one standard deviation (1.109)
increase in regulatory institutions implies 0.3 increase in the proba-
bility of SEG. Neither the property rights nor the democracy index
has such an impact according to the GMM system results.

In addition, Tables 2 and 3 show that the regulatory institutions
have an independent effect on SEG. By this, I mean that they have
an effect on SEG other than the effect we can attribute to TFP. This
independent effect can be explained by other positive externalities of
regulatory institutions on SEG. Indeed, an efficient regulation of
economic activities can favor the entry into the market of new
investors who will exploit new sectors of activities complementary to
the already exploited sectors. This complementarity between private
investments can increase their productivities, the capacity for future
investments, and consequently the probability of SEG.

The results in Tables 2 and 3 show that TFP exerts a positive and
significant effect on SEG. Likewise, the politico-economic institutions
index and the regulatory institutions have an independent effect on
SEG. The question, then, is to determine if these results are robust.

Robustness Checks

I subject my results to additional robustness checks beyond those
relating to the estimation techniques described above. It appears that
the positive effect of TFP, the independent effect of regulatory insti-
tutions, as well as the independent effect of the politico-economic
institutions index on SEG is robust. Indeed, for further robustness
checks, I use a criterion of high SEG, change the definition of SEG,
alter the period of analysis, consider other indexes of institutional
quality, and estimate the models with only the samples of former
colonies or developing countries. TFP, the regulatory institutions,
and the politico-economic institutions index still exert on SEG a pos-
itive and significant effect. The results of all these robustness checks
are not shown but are available upon request.

The last robustness check that I carry out is the consideration of
macroeconomic policy variables; the results are reported below.
Previously, I estimated the effects on SEG of institutions, private
investment, and TFP without controlling for macroeconomic policy

variables. It is possible to overestimate the effects of my variables of interest by being unaware of macroeconomic policy variables effect. Despite the relevance of macroeconomic policy variables, the key is to identify the macroeconomic policy variables that are necessary for my analysis. To my knowledge, there is little or no theoretical work that studies the impact of macroeconomic policies on SEG, but I can take advantage of my theoretical arguments to identify the macroeconomic policy variables likely to affect SEG. For example, I argue that because of the positive effect of TFP on economic competitiveness, TFP can positively affect SEG. It follows then, that each policy variable that affects the level of economic competitiveness can also affect SEG. This last assumption makes it judicious to control for the following macroeconomic policy variables.

I first consider the real exchange rate, which I denote by "Rer." I compute the average values of Rer over five-year intervals from 1960 to 2003. An appreciation of the real exchange rate induces a loss of economic competitiveness and consequently could exert a negative effect on SEG. I obtain this variable from the CERDI dataset.

Size of government, measured by government final consumption as a percent of GDP is the second policy variable that I consider and is denoted "Cons" in my models. I obtain this variable from the World Bank (2005) database. It covers the years over the period 1960–2003, and I compute the average values of this variable over five-year intervals. An increase in government final consumption can possibly involve inflation, which is likely to negatively affect economic competitiveness. Thus, I expect government prefer final consumption to have a negative effect on SEG.

Finally, I consider a variable of trade openness measured by the sum of imports and exports as a percentage of GDP and denoted by "Open" in the models. I obtained this variable from the World Bank (2005) database. It covers the years from the period 1960–2003 subdivided into periods of five years. The effect of this variable on SEG is ambiguous. Indeed, an increase in exports can be perceived as a signal of a competitive economy, whereas an increase in imports competing with local products can mean a loss of economic competitiveness.

Tables 4 and 5 indicate that, independently of the estimation method and the specification used, TFP positively and significantly affects the probability of SEG despite taking into account macroeconomic policy variables. Likewise, in Tables 4 and 5, it appears that

regulatory institutions and the politico-economic institutions index have an independent effect on SEG despite considering the effects of macroeconomic policy variables.

Controlling for macroeconomic policy variables does not change my main results, which therefore remain robust. Taking into account macroeconomic policy variables slightly reduces the coefficients associated with TFP, regulatory institutions, and the politico-economic institutions index, but it does not change their significance.

An analysis of the coefficients of macroeconomic policy variables indicates that they generally have a negative effect on SEG, but none of these controls is significant after correcting for endogeneity. These results do not mean that macroeconomic policies are not necessary for SEG; they simply suggest that after controlling for institutions and TFP, macroeconomic policy variables do not have any direct and significant effect on SEG.

Conclusion

In this article, I analyze the effect of institutions on sustained economic growth (SEG). In contrast to most cross-sectional analyses that are interested in the effect of institutions on the level of per capita income, economic growth, or changes in economic growth regimes, I use panel data. I contend that "good" institutions have positive effects on private investment and thus induce an increase in TFP, which in turn is necessary for SEG. My theoretical arguments reconcile two economic approaches of institutional analysis and allow me to estimate the effect of three various institutions as well as to distinguish the most important institutions for SEG.

The results of econometric estimates with panel data indicate a positive and significant effect of an index of politico-economic institutions on SEG. This index is a proxy for the overall institutional quality and captures the combined effect of political and economic institutions. Likewise, my results show that an improvement in the individual quality of democratic, property rights, and regulatory institutions is favorable for SEG. This shows that all the institutions are necessary for SEG. Among these institutions, however, regulatory institutions are the most important for SEG. Indeed, it is the effect of regulatory institutions that remains significant after taking into account the simultaneous effect of the three institutions on SEG. And, after correcting for endogeneity, regulatory institutions have

TABLE 4
RESULTS OF COMBINED AND SIMULTANEOUS EFFECTS OF INSTITUTIONS ON SEG CONTROLLING FOR PRIVATE INVESTMENT, TFP, AND MACROECONOMIC POLICIES EFFECTS

	OLS	Fixed Effect	GMM System	Probit (RE)	OLS	Fixed Effect	GMM System	Probit (RE)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Index	0.047 (4.17)***	0.105 (3.92)***	0.084 (3.39)***	0.263 (3.47)***				
Reg					0.017 (0.53)	0.159 (2.26)**	0.209 (2.16)**	0.276 (1.53)
Prop					0.066 (3.30)***	0.085 (2.56)**	0.012 (0.26)	0.301 (2.84)***
Dem					−0.010 (0.09)	0.211 (0.84)	0.295 (1.03)	−0.100 (0.18)
Privinv	1.076 (2.35)**	−0.195 (−0.21)	−0.915 (0.71)	0.626 (0.24)	1.122 (2.40)**	−0.202 (0.22)	−0.429 (0.25)	0.878 (0.34)
Tfp	0.385 (3.01)***	0.415 (3.27)***	0.722 (2.14)**	2.908 (4.17)***	0.376 (3.01)***	0.429 (3.31)***	0.592 (2.12)**	2.858 (4.11)***
Rer	0.005 (0.26)	−0.050 (2.32)**	−0.014 (0.47)	0.067 (0.45)	0.006 (0.31)	−0.053 (2.45)**	−0.031 (0.91)	0.068 (0.45)

Open	−0.106	−0.402	−0.146	−0.142	−0.087	−0.413	−0.246	−0.179
	(1.06)	(1.31)	(0.49)	(0.28)	(0.82)	(1.35)	(0.78)	(0.35)
Cons	−0.719	−0.414	−0.857	−3.137	−0.771	−0.365	−0.684	−2.545
	(1.32)	(0.34)	(0.76)	(0.98)	(1.34)	(0.30)	(0.46)	(0.77)
Constant	−0.124	−0.101	0.206	−1.527	−0.051	−0.334	−0.218	−2.221
	(0.91)	(0.27)	(0.57)	(1.55)	(0.29)	(0.72)	(0.41)	(1.99)**
Number of observations	274	274	274	274	274	274	274	274
Number of countries	85	85	85	85	–	85	85	85
Percent of observations[a]	96%	75%	82%		96%	70%	80%	
Sargan-Hansen test[b]			0.200				0.158	
AR (1)[b]			0.002				0.001	
AR (2)[b]			0.829				0.642	
Log of vraisemblance				−123.64				−123.43
Likelihood-ratio test[c]				9.43***				8.95***

*** , and **, respectively, denote coefficients significant at the thresholds of 1 percent and 5 percent. The figures in parentheses are robust t-Student. All the estimates (except for those in OLS) contain temporal dummies whose coefficients are not shown.

[a] These figures are the percents of observations for which the predicted value of the probability of SEG lies between zero and one.

[b] These figures are the p-values associated with various tests, and especially they show that the lagged variables that I use as instruments in the GMM system are good instruments.

[c] These figures are χ^2 values of significance test of random effects in the probit model with random effects. When the test is significant this indicates that the probit model with random effects is preferable to the probit model without random effects.

TABLE 5
RESULTS OF SEPARATE EFFECTS OF INSTITUTIONS ON SEG CONTROLLING FOR PRIVATE INVESTMENT, TFP, AND MACROECONOMIC POLICIES EFFECTS

	OLS			Fixed Effect			GMM System			Probit with Random Effect		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Reg	0.055 (1.92)*			0.136 (2.23)**			0.179 (2.34)**			0.384 (2.41)**		
Prop		0.062 (4.28)***			0.101 (3.43)***			0.069 (1.82)*			0.304 (3.84)***	
Dem			0.221 (2.71)***			0.102 (0.44)			0.376 (1.43)			0.752 (2.35)**
Privinv	1.759 (4.43)***	1.258 (3.09)***	1.609 (4.41)***	-0.405 (0.54)	-0.323 (0.38)	-0.462 (0.60)	0.701 (0.39)	2.890 (1.27)	0.904 (0.58)	4.195 (1.89)*	1.613 (0.80)	4.946 (3.11)***
Tfp	0.462 (3.86)***	0.377 (3.18)***	0.426 (4.13)***	0.433 (3.83)***	0.327 (2.67)***	0.363 (3.40)***	0.899 (2.23)**	0.617 (1.97)**	0.922 (2.93)***	3.151 (4.90)***	2.448 (4.20)***	2.357 (5.18)***
Rer	-0.013 (0.74)	-0.004 (0.20)	-0.009 (0.48)	-0.064 (2.28)**	-0.052 (2.18)**	-0.076 (2.63)***	-0.055 (-1.14)	-0.003 (0.06)	-0.054 (0.91)	-0.075 (0.55)	0.028 (0.21)	-0.052 (0.54)
Open	-0.127 (1.28)	-0.074 (0.78)	-0.020 (0.26)	-0.377 (1.30)	-0.434 (1.34)	-0.245 (0.96)	-0.179 (-0.78)	0.538 (1.29)	-0.245 (0.63)	-0.446 (0.92)	0.107 (0.25)	0.003 (0.01)

Cons	-0.173	-0.938	-1.147	-0.214	-2.503	-2.169	-0.481	-3.444	-0.292	0.741	-4.229	-3.182
	(0.33)	(1.80)*	(2.50)**	(0.20)	(1.83)*	(2.34)**	(-0.30)	(1.79)*	(0.20)	(0.26)	(1.61)	(1.44)
Constant	-0.043	0.069	0.253	0.140	0.763	1.009	-0.008	0.047	0.682	-1.374	-0.771	-0.485
	(0.27)	(0.63)	(2.86)***	(0.36)	(2.52)**	(3.76)***	(-0.01)	(0.10)	(2.10)**	(1.36)	(1.30)	(1.11)
Number of observations	315	305	382	315	305	382	331	305	382	315	305	382
Number of countries				92	88	90	92	88	90	89	88	90
Percent of observations[a]	96%	96%	95%	91%	85%	91%	81%	74%	79%			
Sargan–Hansen test [b]							0.684	0.271	0.237			
AR (1)[b]							0.000	0.000	0.000			
AR (2)[b]							0.820	0.866	0.779			
Log of vraisemblance										-141.33	-40.37	-181.82
Likelihood-ratio test[c]										10.30***	5.27**	2.48*

***, **, and *, respectively, denote coefficients significant at the thresholds of 1 percent, 5 percent, and 10 percent. The figures in parentheses are robust t-Student. All the estimates (except for those in OLS) contain temporal dummies whose coefficients are not shown.
[a]These figures are the percents of observations for which the predicted value of the probability of SEG lies between zero and one.
[b]These figures are the p-values associated with various tests, and especially they show that the lagged variables that I use as instruments in the GMM system are good instruments.
[c]These figures are χ^2 values of significance test of random effects in the probit model with random effects. When the test is significant this indicates that the probit model with random effects is preferable to the probit model without random effects.

the largest meaningful impact on SEG when compared to property rights and democratic institutions.

I also obtain a positive and significant effect of TFP on SEG. This effect of TFP could be due to its favorable effect on economic competitiveness. The positive effect of regulatory institutions on SEG persists, despite considering private investment and TFP effects. This indicates an independent effect of regulatory institutions on SEG. The independent effect of regulatory institutions on SEG could be due to the complementarity between private investments, possibly resulting from the entry into the market of new investors exploiting new sectors that are complementary to the sectors already being exploited. This complementarity between private investments increases investors' productivity, their returns, the capacity for future investment of private enterprises, and consequently the probability of SEG.

My main results—positive and significant effects on SEG of TFP, regulatory institutions, and the index of politico-economic institutions—remain robust to alternative methods of estimation, to the retained samples, to the change of institutional quality indexes, to the use of a criterion of high SEG, to the changes of SEG definition, period of analysis and to the consideration of macroeconomic policy variables.

Through my econometric results, the following economic growth strategies can be suggested. First, initiate economic growth by ensuring the protection of private property rights, to create markets and to favor the development of private investment. This proposition is based on the fact that I show that property rights institutions are more favorable for the development of private investment, which is often noted in the economics literature as necessary for economic growth. Second, implement institutions that guarantee an efficient regulation of economic activities in order to make sustainable economic growth by favoring the entry into the market of more dynamic and more innovative private investors.

My results indicate a suitable role of various institutions for SEG. This is consistent with Gerschenkron's (1962) argument for the role of various institutions in the process of economic development, which Acemoglu, Aghion, and Zilibotti (2004) recently highlighted in their work on the role of institutions for technological innovations and adoptions. My results could be useful to policymakers, especial-

ly in developing countries concerning the sequencing of institutional reforms that they may wish to undertake.

This study opens new avenues for research. Growth economists might be interested in improving our understanding of how TFP affects SEG, perhaps through the process of economic competitiveness. For institutional economists, it would be interesting to improve our understanding about the effect of regulatory institutions on SEG and to build a theoretical model of SEG in which the role of institutions figures prominently

Appendix: List of Countries

The countries used in this study include: Albania, Algeria, Argentina, Australia, Austria, Bahamas, Bahrain, Bangladesh, Barbados, Belgium, Belize, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burundi, Cameroon, Canada, Central Africa, Chad, Chile, China, Colombia, Congo Democratic, Congo Republic, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Fiji, Finland, France, Gabon, Germany, Ghana, Greece, Guatemala, Guinea Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungry, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Kuwait, Latvia, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritius, Mexico, Morocco, Myanmar, Namibia, Nepal, Netherlands, New Zeeland, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, Rwanda, Senegal, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Syria, Tanzania, Thailand, Togo, Trinidad, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Venezuela, Zambia, and Zimbabwe.

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