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Regulatory Framework and Private Investment: Empirical Evidence for Developing Countries

Clarisse Nguedam Ntouko
CERDI-CNRS / University of Auvergne, Clermont 1 (France)

Abstract

This paper analyzes the impact of business regulation on private investment in developing countries with a particular emphasis on sub-Saharan Africa. Using the principal component analysis methodology, we construct the following composite indexes of the regulatory framework: entry regulation, employment regulation, regulation of enforcing contracts, regulation of property registration and business closure regulation. This last indicator is also used as a proxy for investment irreversibility. The empirical analysis is performed with a panel data of 53 developing countries, including 18 sub-Saharan African countries over the period 2003-2007. The empirical results of the 3SLS estimations suggest that the complexity of the regulation of entry and employment has a negative and significant impact on private investment. However, the regulations of enforcing contracts and property registration are not statistically significant. The regulation of business closure measured by the recovery rate of bankrupt firms has a positive and significant effect. We also found that the private investment rate in sub-Saharan Africa would have been improved by about 4.57% over the period 2003-2007 if the average quality of the business regulation in the region had been equal to that of all other regions in our sample, all things being equal.

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Contact: Clarisse Nguedam Ntouko - cl_nguedam@yahoo.fr.

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1. Introduction

Developing countries, particularly those in sub-Saharan Africa (henceforth, SSA) must increase their growth rate for poverty reduction. The achievement of this objective mainly depends on the development of private investment which is an important channel of economic growth since it determines supply, demand, employment and wealth. With the new institutional economics, the role of institutions is increasingly recognized among the determinants of private investment and growth. Macroeconomic reforms implemented under the structural adjustment programs were designed especially for the development of the private sector. Despite these policies, private investment remains very low in most developing countries. This reality suggests that the institutional framework is an important factor of the investment climate in addition to macroeconomic indicators. The complexity of business regulation in most developing countries is due to weak institutions and poor governance. This results in delays, high transaction costs, corruption, weak protection of property rights, uncertainty and irreversibility of investment. These factors are deterrent to investors and may lead them to operate in the informal sector.

Using panel data of 53 countries (including 18 SSA countries) over the period 2003-2007, we analyze empirically the impact of business regulation on private investment. Our econometric model is a simultaneous equations one which takes into account the two-way causality between private investment and business regulation. This paper has several contributions. The first one is to identify business regulation indicators that are deterrent to private investors. For that, we define five indexes of business regulations which are important for the creation and development of firms. In order to avoid collinearity bias, the principal component analysis (PCA) methodology is used to construct four composites indexes measuring respectively: the regulation of entry, the regulation of employment, the regulation of enforcing contracts and the regulation of property registration. The recovery rate of bankrupt firms is used as indicator of the regulation of business closure. This indicator is also used as a proxy for investment irreversibility. The second contribution is to take into account the spatial spillover effects of business regulations between neighboring countries. The third contribution is to introduce, at the macroeconomic level, the investment irreversibility arising from the complexity of business regulations. A special emphasis is put on SSA which has the lowest private investment rate (about 13% of GDP over the period 1984-2007, against 15 to 20% for other developing regions).

The rest of the paper proceeds as follows: The second section is devoted to a brief literature review on the relation between business regulations and private investment; the third section presents the econometric model, the empirical analysis and results, and the fourth section, our concluding remarks.

2. Business regulations and private investment

The theory of regulation is based on two main views: The public interest theory and the public choice theory. The public interest theory (Pigou, 1938) argues that lack of regulation leads to market distortions. It assumes that government makes actions consistent with public interest. The regulation aims to protect public interest and social efficiency. In the case of business regulations, this view implies that government selects new investors to ensure that they meet minimum standards required to provide goods or services.

In contrast, the public choice theory (Tullock, 1967; Stigler, 1971; Peltzman, 1976) supports the idea that politicians, voters, and bureaucrats are mainly self-interested. Indeed, government sets up socially inefficient regulations. This theory comes in two views. The first

view is the capture theory of regulation (Stigler, 1971) which is based on the fact that industry incumbents are able to acquire regulations for rent-seeking and in order to keep out competitors. The second view, called *tollbooth theory* by Djankov *et al*. (2002), supports that regulation is pursued for the benefit of politicians and bureaucrats. According to the public choice theory, politicians use regulations for electoral purposes and rent-seeking.

In a cross-sectional analysis using data on the regulation of entry of start-up firms in 85 countries and the OLS estimator, Djankov *et al*. (2002) find that heavier regulation of entry is generally associated with greater corruption and a larger unofficial economy, but not with better quality of private or public goods. Using OLS and 2SLS estimators, Yakovlev and Zhuravskaya (2007) find a positive effect of deregulation on net entry of firms in Russia over the period 2001-2004. Their results support the public choice theory. Kaplan *et al*. (2007) estimate the effect of a deregulation program on business startups in 93 municipalities in Mexico over the period 1998-2006. They use a discrete duration model and find that reducing the costs of obtaining operating licenses leads to increase the creation of formal firms. Using cross-sectional data for 157 countries and instrumental variable regressions, Barseghyan (2008) shows that high entry costs significantly reduce output per worker and total factor productivity. Alesina *et al*. (2005) analyze the impact of regulation on private investment of non-manufacturing industries in 21 OECD countries over the period 1975-1998. They use OLS and GMM methods to show that deregulation increases total investment. Kolady *et al*. (2010) analyze intellectual property rights in the agricultural sector in India over the period 1996-2007. Using the following estimators: Feasible GLS, SUR and Pooled OLS, they conclude that the protection of intellectual property rights leads to increase crop yields. Besley (1995) analyzes the link between land property rights and investment incentives in two villages in Ghana. He uses OLS and instrumental variable methods. The results of his estimations show that land property rights have a positive effect on private investment.

3. Econometric model and empirical analysis

3.1. Econometric model

There is a two-way causality between business regulations and private investment. An appropriate regulatory framework creates a good investment climate for the private sector. Reversely, private investment may have a direct and indirect effect (through economic growth) on business regulations. Governments may improve their business regulations to attract investments. According to the capture theory of regulation (Stigler, 1971), industry incumbents are able to acquire regulations for rent-seeking and in order to keep out competitors. Through Granger causality tests, Chong and Calderon (2000) find evidence for two-way causality between economic growth and institutions. Thus, private investment through its positive impact on growth can enable countries to have good institutions and attractive regulatory framework.

To incorporate the two-way causality into our analysis, we define a simultaneous equations model which also enables us to take into account other factors that affect private investment and business regulations. In our empirical model, endogenous variables are the private investment rate and the various measures of business regulations:

$$privINV_{i,t} = \alpha_0 + \alpha_1 BR_{i,t} + \alpha_2 X_{i,t} + \eta_{1it} \quad (1)$$

$$BR_{i,t} = \beta_0 + \beta_1 privINV_{i,t} + \beta_2 Y_{i,t} + \eta_{2i,t} \quad (2)$$

where i denotes the country index ($i = 1,.....,N$) and t , the time index ($t = 1,...,T$), $privINV_{i,t}$ is private investment (% of GDP), $BR_{i,t}$, the indexes of business regulations, $X_{i,t}$ and $Y_{i,t}$ are respectively the vectors of control variables for the two equations,

$\eta_{1it} = \nu_i + \mu_t + \varepsilon_{1it}$ and $\eta_{2it} = \nu_i + \mu_t + \varepsilon_{2it}$ are error terms of the two equations that includes the individual component ν_i and the temporal component μ_t . $\varepsilon_{1i,t}$ and $\varepsilon_{2i,t}$ are the idiosyncratic error terms of these two equations.

We defined indicators measuring five dimensions of business regulations, using variables from the World Bank Doing Business database (2010). In order to avoid collinearity bias, we make use of principal component analysis based on the correlation matrix to construct the following composites indexes:

- Regulation of entry $(ENTRY)$: we construct a composite index with three variables: the time (in calendar days), the costs and the minimum capital (as % of income per capita) required to create a business. The complexity of regulation of entry can discourage private investors or lead them to operate in the informal sector. A negative sign is expected.
- Regulation of employment $(EMPLOY)$: a composite index is constructed with three variables: rigidity of employment index, rigidity of hours index and difficulty of firing index. Rigidities of employment regulation can be deterrent to investors by reducing employment opportunities in the formal sector. A negative sign is expected.
- Regulation of enforcing contracts $(CONTRACT)$: a composite index measuring the efficiency of courts for the enforcement of commercial contracts is constructed with three variables: the number of procedures, the time (in calendar days) needed to resolve a dispute, and the costs (as % of the claim value) which include court costs and attorneys fees. The complexity of procedures of contracts enforcement can lead to the increase of corruption and unfairness. A negative sign is expected.
- Regulation of property registration $(PROPERTY)$: this indicator measures the regulation of transfer of a property from seller to buyer. We construct a composite index including two variables: the duration of the registration process, and the formal costs of registering property (as % of property value). A negative sign is expected.
- Regulation of closing a business $(CLOSING)$: we use the recovery rate as a measure of the regulation of closing a business. It is recorded as cents on the dollar recouped by creditors through the bankruptcy, insolvency or debt enforcement proceedings. The calculation takes into account whether the business is kept as a going concern during the proceedings, as well as bankruptcy costs and the loss in value due to the time spent closing down. We also use this indicator as a proxy for investment irreversibility. This indicator is defined on a scale from 0 to 100%, where 0 is assimilated to total irreversibility, and 100% to total reversibility. A positive sign is expected.

We make a standardization of our regulation indexes on the scale [0-10]. For the regulation of entry, employment, contracts and property registration, the value 0 means that the quality of business regulation is very good; and the value 10, means that the quality of business regulation is very bad. In contrast, for the regulation of business closure, the value 0 means that the quality of business regulation is very bad (total irreversibility); and the value 10, means that the quality of business regulation is very good (total reversibility). This approach allows the comparison of the marginal impacts of regulation indexes. Indeed, for each regulation index (BR), we use the following formula for the standardization:

$$BR' = ((BR - Min_{BR})/(Max_{BR} - Min_{BR})) * 10 \quad (3)$$

Where Min_{BR} and Max_{BR} are respectively the minimum and the maximum value of the business regulation index.

The private investment equation is based on the neoclassical flexible accelerator approach. The vector of control variables $X_{i,t}$ includes:

- Annual growth rate of real GDP (GDP): it is used in order to take into account the aggregate demand and the accelerator effect. A positive sign is expected.

- Public investment rate as % of GDP ($pubINV$): the impact of public investment on private investment may be either positive (crowding-in effect) or negative (crowding-out effect). Blejer and Khan (1984) have shown that public investment in social and economic infrastructure (roads, telecommunications, human capital, etc.) can contribute to decrease the production costs in the private sector and improve firm productivity. In contrast, productive public investment can crowd-out private investment (Khan and Kumar, 1997). Due to the lack of disaggregated data on public investment, we use the aggregate public investment rate.
- Macroeconomic instability ($INSTABILITY$): we construct a composite index consisting of the inflation rate (consumer price index), the total debt (as % of exports of goods and services) and the deterioration of terms of trade, approximated by the inverse of the terms of trade (ratio between the imports index and the exports index of goods and services). Macroeconomic instability is assumed to reduce the predictability of the investment climate and increase the risk perceived by investors. A negative sign is expected.
- Macroeconomic policy ($POLICY$): this variable is a composite index made by trade policy and financial development. The trade policy is measured by trade openness (total exports and imports as % of GDP, excluding oil exports). Financial development (measured by credit to private sector as % of GDP) is used to take into account the financial constraints faced by firms. A positive sign is expected.
- Natural resources ($NatRess$): we use oil rents (as % of GDP) as a proxy for natural resources. Natural resources can have a positive impact especially on foreign direct investment (henceforth, FDI). In most developing countries, FDI is generally concentrated in the oil sector. However, the local manufacturing sector can be penalized, as in the case of Dutch disease. In the context of natural resources abundance, market imperfections and weak institutions may discourage domestic private investors and lead to the increase of unproductive rent-seeking activities (Hausman and Rigobon, 2002). A negative sign is expected.
- In order to capture SSA regional specificities, we introduce into the investment equation a regional dummy (SSA) that takes the value 1 for SSA countries, and 0 for others. We also introduce a multiplicative SSA regional dummy for each regulatory index.

The vector of control variables $(Y_{i,t})$ of the business regulation equation includes:

- Annual growth rate of GDP (GDP): economic growth is likely to enable countries to have good institutions and less complex business regulations. A negative sign is expected for the impact of GDP growth on the regulation of entry, employment, contracts, and property, since a high value of these indexes means that regulations are complex. However, GDP growth is expected to have a positive effect on the regulation of business closure measured by the recovery rate of bankrupt firms because a high value means that investment is more reversible.
- Natural resources ($NatRess$): the impact of natural resources on the quality of institutions is based on the natural resource curse hypothesis (Sachs and Warner, 1995). It refers to a situation in which natural resource abundance leads to poor institutional quality and low economic growth. A positive sign is expected for the impact of natural resources on the regulation of entry, employment, contracts, and property, since a high value of these indexes means that regulations are complex. However, natural resources are expected to have a negative effect on the regulation of business closure because a high value of the recovery rate reflects the reversibility of investment.
- Business regulations in neighboring countries: for each regulation index, we construct the corresponding average index for the neighboring countries. This variable is used as instrument to identify the model. It is presented in more detail in section 3.3 which deals with endogeneity and identification strategy.

3.2- Data

Our sample covers a panel of 53 countries, including 18 SSA countries over the period 2003-2007 (Appendix A). The countries and the time period have been selected on the basis of data on business regulations which are available only from 2003. Descriptive statistics and data sources are reported in table I (Appendix B).

3.3- Endogeneity and identification strategy

The two-way causality between business regulations and private investment is a source of endogeneity. This can lead to biased results and make difficult the interpretation of the causality. Omitted variables and measurement errors of variables are other potential sources of endogeneity. OLS method would produce biased and inconsistent estimators in these cases. The causal effect of business regulations on private investment can be estimated using instrumental variables. The instruments generally used in empirical studies on institutions are: religion (Mobarak, 2005), settler mortality rate (Acemoglu *et al*., 2001), language and geography (Hall and Jones, 1999), legal origin (La Porta *et al*., 1999), and ethnolinguistic fractionalization (Mauro, 1995). The limit of these instruments is the temporal invariability. Indeed, their use is inappropriate for panel models.

In order to identify our model, we construct an instrument based on the geography of institutions (Bosker and Garretsen, 2009; Persson and Tabellini, 2008), especially the spatial spillover effects of institutions between neighboring countries. The geographical proximity between countries may determine the quality of institutions. The relative location of a country can either hinder or enhance the development of national institutions based on the quality of institutions in neighboring countries. According to Jörgens (2004), there are three mechanisms of transmission of institutions between neighboring countries: harmonization, unilateral imposition and diffusion. The harmonization arises from the cooperation in decision making between several countries. It can occur at different levels (global, regional or sub-regional). There is unilateral imposition if institutions and policies are dictated to a country by international organizations or other countries. The unilateral imposition can be in the form of non-violent and coercive economic and policy measures. An example of a non-violent form of unilateral imposition can be represented by the conditionalities attached to aid or the Copenhagen criteria for accession of Central and Eastern Europe countries to the European Union. The diffusion of institutions can occur in different ways. Governments can choose to imitate or change their business regulation strategies (with those of their neighbors in mind) in order to increase investment, trade and/or to deal with competition policies. Easterly and Levine (1998) show through a cross-sectional analysis that policy choices are contagious across national borders in SSA. Given that these mechanisms (harmonization, unilateral imposition and diffusion) are subject to costs related to distance, it is plausible that they occur more frequently and more intensely between neighboring countries that generally share cultural and historical similarities.

We construct indexes of business regulations of neighboring countries by performing a matrix multiplication between a spatial contiguity matrix (which identifies all neighboring countries of each country) and the vector of business regulations indexes of each country. The spatial contiguity matrix (CEPII database) determines the contiguity C_{ij} between two countries i and j as follows:

$C_{ij} = 1$ if country i and country j have a common border

$C_{ij} = 0$ if country i and country j have no common border.

For each business regulation index, we compute the corresponding average index for the neighboring countries as follows:

$$BR_{i,t}^{N} = \sum_{j=1}^{n_i} \frac{1}{n_i} BR_{j,t} \quad (4)$$

With $BR_{i,t}^{N}$, the average index of business regulation of all neighboring countries j of country i; n_i, the number of neighboring countries of country i; $BR_{j,t}$, the index of business regulation in each neighboring country j of country i. The contiguity matrix of CEPII assigns the same weight to all neighboring countries. Ehrhart (2012), and Bosker and Garretsen (2009) use the same weighting system. Other weighting systems based on the distance between countries (Persson and Tabellini, 2009), the length of the common border shared by neighboring countries (Murdoch and Sandler, 2002), and the size of GDP (Easterly and Levine, 1998), are used in the literature. In order to test the robustness of our results, we use another identification variable which for each home country i is the average index of business regulation of all other countries j, weighted by the inverse of the distance between the capital of the home country i and the capital of each country j. This variable and its construction are presented in more details in Appendix C2 devoted to the robustness test.

3.4- Estimation method and results

3.4.1- Estimation method

In order to control for endogeneity and take into account the two-way causality between private investment and business regulation, the Three-Stage Least Squares (3SLS) estimator is used for the regressions. Due to the multidimensional nature of business regulations, we perform five sets of regressions respectively with each business regulation index. This approach allows us to identify the impact of each dimension of business regulation on private investment.

3.4.2- Estimation results

The results are reported in tables II and III (Appendix C1). The complexity of the regulation of entry and employment has a negative and significant effect on private investment (equations (1) and (3)). The regulations of enforcing contracts and property registration are not statistically significant. The recovery rate of bankrupt firms has a positive and significant effect on private investment (equation (9)). Indeed, reversibility has a positive impact on private investment. The following SSA multiplicative regional dummies: *SSA*ENTRY*, *SSA*CONTRACT* are negative and significant. The SSA multiplicative regional dummy of the recovery rate (*SSA*CLOSING*) is positive and significant. Thus, the complexity of the regulation of entry, enforcing contracts and business closure has been deterrent especially for SSA countries. Equations (2), (4), (6), (8) and (10) show that business regulation indexes of neighboring countries have positive and significant impact on the corresponding business regulations indexes. This result confirms the interactions of business regulations between neighboring countries. Our results are robust to the use of another identification variable (Appendix C2, Tables IV and V).

Regarding control variables, the annual growth rate of GDP has a positive and significant effect on private investment (equations (5), (9)). The economic growth tends to reduce the complexity of business regulations (equation (8)). Private investment has a negative and significant effect on the complexity of business regulations (equations (2), (8)) and a positive effect on the recovery rate. Public investment has a significant crowding-in effect on private investment (equations (1), (3)). Macroeconomic instability has a negative and significant effect in each private investment equation. The impact of macroeconomic policy index is not significant. Natural resources are detrimental to private investment and business regulations. This result is consistent with the natural resource curse hypothesis.

3.4.3- Assessing the marginal impact of improving business regulations in SSA over the period 2003-2007

We seek to determine the potential level of private investment that SSA would have reached over the period 2003-2007 if its business regulation quality had been equal to the average of other regions of our sample over the period. To calculate the marginal impact of the improvement of each regulation index, we consider the results obtained with business regulations indexes of neighboring countries (Tables II and III, Appendix C1). For each business regulation index, we add up the estimated coefficient and the estimated coefficient of the multiplicative SSA regional dummy. Only significant coefficients are considered. Then we multiply this sum of coefficients by the gap between the average value of the index in SSA and the average value in all other regions. It results that private investment rate in SSA would have been improved by about 4.57% over the period if the average quality of the business regulation in the region had been equal to that of all other regions in our sample for all business regulation indexes (Table VI, Appendix C3). This result is valid only if all other factors remain unchanged over the period. The regulation of contracts has been the most detrimental to private investment in SSA (marginal impact of about 1.58% of GDP), followed by the regulation of employment (marginal impact of about 1.35% of GDP), the regulation of business closure (marginal impact of about 0.91% of GDP) and the regulation of entry (marginal impact of about 0.72% of GDP).

4. Concluding remarks

The regulatory burden leads to the low level of private investment in developing countries. The regulation of employment, entry and business closure have been detrimental to private investment for our total sample. SSA would have improved its private investment rate if the average quality of business regulation had been equal to that of all other regions in our sample, all things being equal. During the period, the regulation of contracts, followed by the regulation of employment, business closure and entry have been predominantly responsible for the low level of private investment in SSA. The results implicitly reflect the negative impact of irreversibility arising from the complexity of business regulations. The negative effect of natural resources may be due to the low quality of institutions and poor governance that encourage rent-seeking behaviors instead of productive activities. This result is consistent with the natural resource curse hypothesis. We also found evidence of the spatial spillover effects of business regulations between neighboring countries. Our results are robust to the use of another identification variable, especially the average index of business regulation weighted by the inverse of the distance between countries capitals.

These findings bring new empirical evidence on the determinants of private investment in developing countries, in addition to traditional determinants such as growth, public investment and macroeconomic instability. Our findings suggest a number of implications in terms of policy implementation. The results are in favor of simplification of business regulations. The creation of a one-stop shop could reduce the number of procedures, the time and the costs of business start-up in the formal sector. The reduction of macroeconomic instability, particularly through the control of inflation and debt as well as improving terms of trade, could make the investment climate more attractive and contribute to increase the private investment rate. An empirical analysis using microeconomic data at firm-level could be complementary to this paper by providing interactions between business regulations and characteristics of firms, such as activity sector and size.

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APPENDIXES

APPENDIX A: Sample

Total sample
Argentina, Bangladesh, Benin, Bolivia, Botswana, Brazil, Cambodia, Cameroon, Chile, China, Colombia, Congo Republic, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Gabon, Ghana, Guatemala, Haiti, Honduras, Indian, Indonesia, Jordan, Kenya, Malaysia, Mexico, Mongolia, Morocco, Mozambique, Nicaragua, Nigeria, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Senegal, South Africa, Sudan, Tanzania, Thailand, Togo, Tunisia, Turkey, Uruguay, Venezuela, Vietnam, Yemen, Zambia.
SSA sample
Angola, Benin, Botswana, Cameroon, Congo Republic, Côte d'Ivoire, Ethiopia, Gabon, Ghana, Kenya, Mozambique, Nigeria, Senegal, South Africa, Sudan, Tanzania, Togo, Zambia.

APPENDIX B

Table I: Descriptive statistics and data sources (2003-2007)

	Total sample					SSA sample				
	Mean	**Std. Dev.**	**Min.**	**Max.**	**Obs.**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**Obs.**
Standardized regulatory indexes (The World Bank, Doing Business database, 2010)										
ENTRY	0.83	1.13	0	10	590	1.08	1.09	0	10	201
EMPLOY	0.87	1.56	0	5.38	645	1.46	1.54	0	4.38	220
CONTRACT	2.76	1.95	0	10	589	3.55	2.28	0.78	10	200
PROPERTY	2.22	1.64	0	10	482	3.22	1.53	0.56	7.56	164
CLOSING	3.22	2.42	0	10	597	2.42	2.29	0	9.25	200
Standardized regulatory indexes of neighboring countries										
$ENTRY^N$	1.61	1.38	0	10	555	1.98	0.90	0.13	5.80	190
$EMPLOY^N$	4.17	1.39	0	7.58	555	4.99	1.10	2.78	7.58	190
$CONTRACT^N$	4.56	1.42	0	10	555	13.31	3.35	5.89	10	190
$PROPERTY^N$	1.99	1.31	0	10	444	2.94	0.89	1.17	5.32	152
$CLOSING^N$	3.67	1.78	0	10	555	2.84	1.34	0.57	6.02	190
Standardized regulatory indexes weighted by the inverse of distance between capitals										
$ENTRY^D$	3.59	0.77	0	10	555	3.93	0.85	2.15	9.94	190
$EMPLOY^D$	2.04	0.73	0	10	555	2.52	1.46	1.70	10	190
$CONTRACT^D$	0.94	0.64	0	10	555	1.31	1.34	0.89	10	190
$PROPERTY^D$	1.30	0.66	0	10	444	1.85	1.25	0.97	10	152
$CLOSING^D$	2.04	1.66	0	10	555	0.98	0.53	0.19	2.81	190
Macroeconomic variables(*)										
privINV	16.27	7.56	0.62	55.14	663	13.71	6.62	0.62	42.32	219
pubINV	7.38	5.96	0	50.62	670	7.29	4.01	1	23.53	219
INSTABILITY	-0.11	0.46	-0.97	2.34	379	-0.14	0.47	-0.81	1.82	140
POLICY	0.13	1.05	-1.72	4.46	539	-0.3	0.99	-1.47	3.64	187
GDP	6.05	4.49	-10.4	37.99	660	5.21	5.11	-10.4	37.99	218
NatRess	16.85	30.81	0	176.17	447	27.8	47.04	0	176.17	113

Notes: (*) *privINV*, *pubINV* (World Economic Outlook, 2009; African Development Indicators 2008). *INSTABILITY*, *POLICY*, *GDP* (World Development Indicators, 2009).
NatRess (Oil and gas rent database, The World Bank, 2010).
^{N} : Average index of business regulation of all neighboring countries j of country i.
^{D}: Average index of business regulation of all countries j other countries than the country i, weighted by the inverse of the distance between the capital of the home country i and the capital of each country j.

APPENDIX C: Estimation results

APPENDIX C1: Basic results

Table II: 3SLS estimation results

	Endogenous Variables		Endogenous Variables		Endogenous Variables	
Explanatory Variables	***privINV*** **(1)**	***ENTRY*** **(2)**	***privINV*** **(3)**	***EMPLOY*** **(4)**	***privINV*** **(5)**	***CONTRACT*** **(6)**
ENTRY	-1.162** (-2.145)					
EMPLOY			-1.519* (-1.669)			
CONTRACT					-0.411 (-1.147)	
pubINV	0.149* (1.813)		0.167* (1.871)		0.0375 (0.480)	
INSTABILITY	-3.120*** (-4.773)		-2.874*** (-3.674)		-4.466*** (-5.878)	
POLICY	-0.145 (-0.523)		-0.0210 (-0.0573)		-0.203 (-0.670)	
GDP	0.124 (1.487)	-0.00433 (-0.365)	0.00396 (0.0384)	0.00646 (0.179)	0.166** (2.051)	0.0478 (1.330)
NatRess	-0.0444*** (-3.832)	0.00108 (0.556)	-0.0227 (-1.512)	0.0191*** (3.263)	-0.0614*** (-5.323)	-0.00128 (-0.210)
SSA	-3.270*** (-5.088)		-3.620*** (-2.769)		-6.806*** (-4.317)	
SSA*ENTRY	-0.793*** (9.636)					
SSA*EMPLOY			0.352 (0.351)			
SSA*CONTRACT					-1.317*** (-2.683)	
privINV		-0.0541** (-2.191)		-0.0850 (-1.179)		0.0263 (0.445)
$ENTRY^N$		0.216*** (3.774)				
$EMPLOY^N$				0.165* (1.670)		
$CONTRACT^N$						0.170*** (6.323)
Constant	15.73*** (22.87)	-0.357 (-0.942)	17.33*** (17.13)	2.879** (2.329)	16.35*** (14.27)	0.208 (0.211)
Number of Obs.	231	231	177	177	231	231

Note: Significativity thresholds: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%. z-statistics in parentheses.

^{N} : Average index of business regulation of all neighboring countries j of country i.

Table III: 3SLS estimation results (continued)

	Endogenous Variables		Endogenous Variables	
Explanatory Variables	***privINV*** **(7)**	***PROPERTY*** **(8)**	***privINV*** **(9)**	***CLOSING*** **(10)**
PROPERTY	-1.641 (-1.029)			
CLOSING			0.336*** (2.970)	
pubINV	0.0565 (0.546)		0.100 (1.321)	
INSTABILITY	-2.682*** (-3.938)		-3.003*** (-4.691)	
POLICY	0.413 (1.059)		0.00773 (0.0294)	
GDP	0.0294 (0.178)	-0.126*** (-3.325)	0.145* (1.763)	-0.0509 (-1.152)
NatRess	-0.0250* (-1.912)	0.0171*** (2.962)	-0.0429*** (-3.763)	-0.00646 (-0.838)
SSA	2.265 (0.707)		-3.313*** (-5.287)	
SSA*PROPRERTY	-2.526 (-1.579)			
SSA*CLOSING			0.422*** (5.073)	
privINV		-0.142** (-2.241)		0.176** (2.033)
PROPERTY^N		0.400*** (3.911)		
CLOSING^N				0.352*** (4.811)
Constant	13.41*** (3.913)	4.299*** (3.765)	13.84*** (18.41)	-0.413 (-0.294)
Number of Obs.	178	178	231	231

Note: Significativity thresholds: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%. z-statistics in parentheses.

^{N} : Average index of business regulation of all neighboring countries j of country i.

APPENDIX C2: Robustness test

The robustness test is based on the use of another identification variable for our model. Indeed, for each home country i, we calculate the average index of business regulation of all other countries j weighted by the inverse of the distance between the capital of the home country i and the capital of each country j. The idea is that countries may share cultural and historical similarities without having a common border. This index is constructed by performing a matrix multiplication between a spatial distance matrix (CEPII distance database) which identifies the distance between capitals of countries, and the vector of business regulation indexes of each country. This methodology aims to assign a weight to

each country according to the distance between capitals. Thus, in our weighting system, the weight assigned to each country decreases with geographic distance between capitals. Persson and Tabellini (2009) use a weighting matrix of the distance between all countries in the world with weights decreasing with geographic distance.

For each business regulation index of the home country i, we compute the corresponding average index of all other countries j weighted by the inverse of the distance between the capital of country i and the capital of each country j as follows:

$$BR_{j,t}^{D} = \sum_{j=1}^{n_j} \frac{1}{D_{ij}} BR_{j,t} \quad (5)$$

With:

$BR_{j,t}^{D}$, the average index of the business regulation of all countries j other than the home country i, weighted by the inverse of the distance between the capital of country i and the capital of each country j;

D_{ij} , the distance between capital cities of country i and j;

n_j, the number of countries j other than country i. It corresponds to the total number of countries in our sample, minus 1;

$BR_{j,t}$, the index of business regulation in each country j other than country i.

The estimation results (with this new instrumental variable) reported in tables IV and V show that the results of our main variables are robust. Indeed, the complexity of regulations of entry and employment has negative and significant effects on private investment. The regulations of contracts enforcement and property registration remain non significant. The recovery rate has a positive and significant effect on private investment. The following SSA multiplicative regional dummies: $SSA * EMPLOY$, $SSA * CONTRACT$ are negative and significant. The SSA multiplicative regional dummy of the recovery rate ($SSA * CLOSING$) is positive and significant. Unlike the basic results with business regulation indexes of neighboring countries, the multiplicative regional dummy of the regulation of entry ($SSA * ENTRY$) is not significant. Equations (12), (14), (16), (18) and (20) show that average indexes of business regulation weighted by the inverse of the distance between capitals ($ENTRY^{D}$, $EMPLOY^{D}$ $CONTRACT^{D}$, $PROPERTY^{D}$, and $CLOSING^{D}$) have positive and significant impact on the corresponding business regulations indexes. This result confirms the interactions of business regulations according to the distance between countries.

Regarding the control variables, our findings remain concordant with the basic results. However, the macroeconomic policy index now has a positive effect on private investment (equation (17)). The GDP growth has a positive and significant effect on private investment (equations (13), (17), (19)) and on the recovery rate (equation (20)). Economic growth tends to reduce the complexity of business regulations (equation (18)). Public investment has a crowding-in effect on private investment (equation (11)). Macroeconomic instability has a negative and significant effect on private investment. Natural resources are detrimental to private investment (equations (11), (13), (15), (17), (19)). The abundance of natural resources has a positive effect on the complexity of business regulations (equation (18)). This result is consistent with the natural resource curse hypothesis.

Table IV: 3SLS estimation results of the robustness test

	Endogenous Variables		Endogenous Variables		Endogenous Variables	
Explanatory Variables	***privINV*** **(11)**	***ENTRY*** **(12)**	***privINV*** **(13)**	***EMPLOY*** **(14)**	***privINV*** **(15)**	***CONTRACT*** **(16)**
ENTRY	-0.025*** (-8.27)					
EMPLOY			-0.214* (-1.71)			
CONTRACT					1.031 (1.43)	
pubINV	0.110* (1.72)		0.064 (0.81)		0.002 (0.04)	
INSTABILITY	-1.610** (-2.55)		-3.409*** (-5.09)		-2.304*** (-4.23)	
POLICY	0.379 (1.58)		0.001 (0.00)		-0.232 (-1.19)	
GDP	0.064 (0.76)	-0.004 (-0.16)	0.154* (1.88)	0.031 (0.63)	0.123 (1.45)	-0.025 (-0.49)
NatRess	-0.045*** (-3.90)	-0.004 (-0.97)	-0.054*** (-3.74)	0.000 (0.03)	-0.052*** (-4.36)	0.013 (1.33)
SSA	-2.094*** (-3.35)		-2.888*** (-4.44)		-4.207*** (-7.05)	
SSA*ENTRY		-0.004 (-0.05)				
SSA*EMPLOY				-0.919*** (-6.93)		
SSA*CONTRACT						-0.599*** (-6.42)
privINV		-0.135*** (-2.74)		-0.113 (-1.16)		-0.357*** (-4.12)
$ENTRY^D$		0.086* (1.77)				
$EMPLOY^D$				0.021* (1. 93)		
$CONTRACT^D$						1.413* (1.76)
Constant	26.329*** (18.00)	5.221*** (8.12)	14.705*** (11.05)	5.509*** (4.66)	13.101*** (14.35)	-3.126** (-2.56)
Number of Obs.	231	231	177	177	231	231

Note: Significativity thresholds: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%. z-statistics in parentheses.

^{D}: Average index of business regulation of all countries j, weighted by the inverse of the distance between the capital of the home country i and the capital of each country j.

Table V: 3SLS estimation results of the robustness test (continued)

	Endogenous Variables		Endogenous Variables	
Explanatory Variables	***privINV*** **(17)**	***PROPERTY*** **(18)**	***privINV*** **(19)**	***CLOSING*** **(20)**
PROPERTY	-1.359 (-1.20)			
CLOSING			0.465** (2.29)	
pubINV	-0.213 (-0.89)		0.081 (1.31)	
INSTABILITY	-3.161*** (-3.43)		-2.200*** (-3.68)	
POLICY	1.678* (1.73)		0.045 (0.21)	
GDP	0.952** (2.11)	-0.123*** (-3.46)	0.149* (1.81)	0.097* (1.72)
NatRess	-0.077*** (-4.36)	0.019*** (3.47)	-0.038*** (-3.33)	0.006 (0.60)
SSA	14.736 (1.51)		-3.484*** (-5.84)	
SSA*PROPRERTY	-0.194 (-1.18)			
SSA*CLOSING			0.460*** (4.65)	
privINV	-0.069 (-1.01)		0.411*** (3.72)	
PROPERTY^{D}		1.457*** (3.56)		
CLOSING^{D}				0.350** (2.13)
Constant	-7.902 (-0.74)	1.932 (1.27)	13.515*** (13.72)	-2.208 (-1.30)
Number of Obs.	178	178	231	231

Note: Significativity thresholds: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%. z-statistics in parentheses.

^{D}: Average index of business regulation of all countries j, weighted by the inverse of the distance between the capital of the home country i and the capital of each country j.

APPENDIX C3: Marginal impact of business regulation in SSA

Table VI: Marginal impact of improving business regulation indexes on private investment in SSA (2003-2007)

	ENTRY	*EMPLOY*	*CONTRACT*	*PROPERTY*	*CLOSING*
Average in SSA	1.08	1.46	3.55	3.22	2.42
Average in others regions (*)	0.71	0.57	2.35	1.71	3.62
Regulatory gap	-0.37	-0.89	-1.20	-1.51	1.20
Estimated coefficients of regulation indexes	-1.162	-1.519	-0.411(NS)	-1.641(NS)	0.336
Estimated coefficients of multiplicative SSA regional dummies	-0.793	0.352(NS)	-1.317	-2.526(NS)	0.422
Sum of significant coefficients	-1.955	-1.519	-1.317	0	0.758
Marginal impacts	0.723	1.351	1.580	0	0.909
Sum of marginal impacts	4.57				
Current private investment rate in SSA (2003-2007)	13.71				
Potential private investment rate in SSA (2003-2007)	18.28				

(*): Average index of business regulation in all other regions in our sample (East Asia and Pacific, North Africa and Middle East, Eastern Europe and Central Asia, Latin America and the Caribbean, Asia South).
(NS): Non-significant coefficient.