Improving business environment: A key to unlock investment. Evidence from manufacturing firms in Senegal

Diagne, Youssoupha S

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Improving business environment: A key to unlock investment. Evidence from manufacturing firms in Senegal

Youssoupha S Diagne[1]

zack.diagne@gmail.com

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Abstract

This paper deals with the impact of poor business environment on Total Factor Productivity (TFP), output and investment of manufacturing firms in Senegal. A benchmark study coupled with results from the World Bank Enterprise Survey narrowed down the list of relevant constraints to doing business in Senegal. As a result, a Real Business Cycle model in a Small Open Economy is used to measure the impact of crime, corruption, power interruptions, poor infrastructures, and tax burden and regulations. Results show that poor business environment has sizeable negative impact on output and investment which is a common feature of recent studies. Solving those problems would lead to both investment and output increasing respectively by 94% and 79%.

Keywords: Business environment, Total Factor Productivity, Real Business Cycles Model

JEL Classification : O16, D24, E32

[1] Economist at the Department of Forecasting and Economic Studies of the Senegalese Ministry of Economy and Finance. Special thanks go to Mr Abdou Salam Thiam, Economist for his cooperation in the gathering of information from APIX.

Impact of business environment on investment and output of manufacturing firms in Senegal

I. INTRODUCTION

There has been a great deal of papers dedicated to the output enhancing role of investment (Solow 1956, Mankiw 2002, Stiglitz 2000, Krueger 2010) in relation to the opportunities in terms of capital, jobs, and technology. In this respect, business environment needs to be eased and attractive enough in order to encourage investment. Business environment can be defined as the legal, fiscal, institutional and regulatory conditions in which firms operate. The impact of business environment improvement on investment has been the focus of many studies (Dethier and al 2010, Venture 1997, Sinha and Fiestas 2011). Those papers identified productivity as being the vehicle through which business environment improvement affects firms' performance. The awareness of the crucial role of private sector in stimulating output growth led the Senegalese government with the World Bank support to hold since 2002 annual meetings of the committee in charge of investment as part of its Accelerated Growth Strategy. Both private and public sectors are represented in the committee which mission is to identify the main constraints to investment in order to address them. Furthermore, the government created establishments such as the Investment Promotion Agency, the Exports Promotion Agency, and the Department of Private Sector Support. These initiatives led to Senegal achieving significant progress in areas such starting business or resolving insolvency. Yet, Senegal is still lags behind many countries as shown in the latest Doing Business report (2014) losing 8 places and reaching the 178th position among 189 countries. Furthermore, poor business environment is still a major

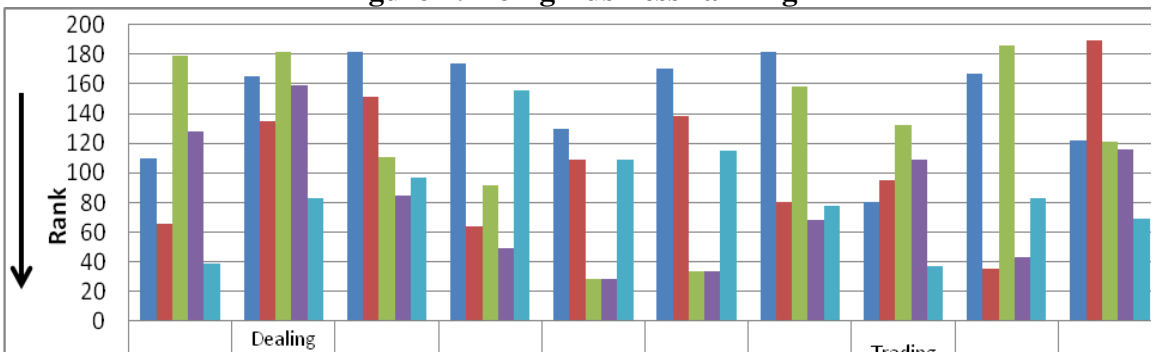
concern according to firms interrogated in the opinion survey performed monthly by the Department of Forecasting and Economic Studies. Moreover, the average growth of private investment has only been 3.6% between 2000 and 2012 and represents 17.7% of GDP. And foreign direct investment accounted for only 2% of GDP in 2001-2011 and grew at an average rhythm of 0.3% between 2002 and 2011. A research dedicated to business environment is therefore justifiable in order to identify the main weaknesses of Senegal and measure their impact. Precisely, the study is going to evaluate the effect of poor business environment on investment and output of manufacturing firms in Senegal. For this purpose, data from the World Bank Enterprise Survey along with conclusions drawn from a descriptive study are going to serve as inputs in a Small Open Economy (SOE) approach (Mendoza, 1991).

The remainder of the paper proceeds as follows: the next section is dedicated to the stylized facts, then theoretical and empirical literature is summarized, the methodology is presented in section 4, the model is calibrated to reflect Senegalese data at section 5, section 6 shows the main results and their interpretation and finally section 7 draws the conclusions and gives recommendations.

II. STYLIZED FACTS

Let's take a look at the Senegal's Doing Business results against better performing countries. Comparing countries are chosen from the same category as Senegal i.e. Lower Middle Income countries according to the World Bank classification. Thus, countries selected to be part of the sample that compares to Senegal are Cape Verde, Morocco, India, and Ghana. Senegal lags behind these countries in terms of the overall Doing Business ranking.

Figure 1: Doing Business ranking



	Starting a business	Dealing with construction permits	Getting electricity	Registering property	Getting credit	Protecting investors	Paying taxes	Trading across borders	Enforcing contracts	Resolving insolvency
SEN	110	165	182	174	130	170	182	80	167	122
CPV	66	135	151	64	109	138	80	95	35	189
IND	179	182	111	92	28	34	158	132	186	121
GHA	128	159	85	49	28	34	68	109	43	116
MOR	39	83	97	156	109	115	78	37	83	69

Source: *2014 Doing Business Report, World Bank*

Figure 1 shows that improvements are necessary in the following areas if Senegal wants to catch up with the other countries:

- Electricity connections;
- credit access;
- property registration;
- protection of investors;
- tax payment and;
- contract enforcement.

Table 1 provides a more detailed view of those variables for a better understanding of Senegal's weaknesses. Clearly, tremendous efforts are to be made in areas such as electricity connection and property registration to reduce the costs and the time spent. The Challenge the tax administration faces is to ease the tax payment process by shortening the time spent by taxpayers and reducing the number of payments. Poor results are also obtained by Senegal compared to the other countries of the sample for the credit access and investors protection indicators. With regards to credit access, improvements are needed in the coverage, extent and quality of credit

information available through public credit registries and private credit bureaus. Indicators also show that in Senegal, the corporate legislation fails to protect minority shareholders in the event that directors use corporate assets to serve their own benefit. This is reflected in the low performances of the “Extent of director liability” and “Ease of shareholder suits” indexes. So, more precision is now provided on the reasons Senegal lags behind the other countries with regards to Doing Business parameters.

Table 1. Doing Business indicators: countries comparison

	Getting electricity		
	Procedures (number)	Time (days)	Cost (% income per capita)
Cape Verde	7	88	888.0
India	7	67	230.7
Ghana	4	79	2,295.3
Morocco	5	62	2,476.3
Senegal	8	113	5,918.2

	Registering property		
	Procedures (number)	Time (days)	Cost (% property value)
Cape Verde	6	22	3.7
India	5	44	7.0
Ghana	5	34	1.2
Morocco	8	60	5.9
Senegal	6	122	15.2

	Getting credit			
	Strength of legal rights index (0-10)	depth of credit information index (0-6)	Public registry coverage (% of adults)	Private bureau coverage (% of adults)
Cape Verde	3	5	17.3	0.0
India	8	5	0.0	19.8
Ghana	8	5	0.0	10.4
Morocco	3	5	0.0	19.6
Senegal	6	1	1.0	0.0

	Paying taxes		
	payments (number per year)	time (hours per year)	total tax rate (% of profit)
Cape Verde	30	186	37.2
India	33	243	62.8
Ghana	32	224	22.9
Morocco	6	232	49.6
Senegal	59	644	48.5

	Protecting investors			
	Extent of disclosure index (0-10)	Extent of director liability index (0-10)	Ease of shareholder suits index (0-10)	Strength of investor protection index (0-10)
Cape Verde	1	5	6	4.0
India	7	4	8	6.3
Ghana	7	5	7	6.3
Morocco	6	2	6	4.7
Senegal	6	1	2	3.0

	Enforcing contracts		
	Procedures (number)	Time (days)	Cost (% of claim)
Cape Verde	37	425	19.8
India	46	1,420	39.6
Ghana	36	495	23.0
Morocco	40	510	25.2
Senegal	43	770	36.4

Source : 2014 *Doing Business report, World Bank*

Furthermore, areas where Senegal shows poor performance are also indicators that it fails to significantly improve as shown in the appendix.

Additional variables such as corruption and governance quality matter when it comes to appreciate business environment quality. That information is available through indicators provided by the World Bank and Transparency International. Evidence of the positive effects of governance and institutions quality on growth can be found in Acemoglu and al. (2001) and Rodrik and al. (2004) Table 2 shows performances achieved by the same set of countries with regards to the perception of corruption and the quality of public sector management and institutions:

Table 2 Institutions quality and corruption

	CPIA public sector management and institutions (1 - 6)	Corruption perception index
Cape Verde	4	60
Ghana	3.7	45
India	3.6	36
Morocco		37
Senegal	3.6	36

Note : *low corruption indexes corresponds to high level of perceived corruption*

Sources : *World Development Indicators Database for CPIA and Transparency International for CPI in 2012*

Senegal obtains the lowest performance in terms of corruption perception but while obtaining the same level as India and being close to Morocco. Senegal shares therefore the 94th rank (among 178 countries) with India according to the Transparency International rating. Transparency International also provides a detailed view of corruption perception by institution. Table 3 displays results achieved by our sample of countries for a selected number of institutions:

Table 3: corruption perception

	Parliament /legislature (*)	Business/ private sector (*)	Judiciary (*)	Police (*)	Registry and permit services (**)	Tax revenue authorities (**)	customs (**)
Ghana	3,6	3.0	4.0	4.7	4.1	3.7	4.1
India	3.8	3.4	3.3	4.1	3.7	3.1	3.3
Morocco	3.8	3.6	4.0	4.2	3.1	2.9	3.1
Senegal	3.6	2.9	4.0	4.1	4.2	3.4	4.2

Sources: *(*) Transparency international, Global Corruption Barometer, 2013*
(**)Transparency International Bribe Payers Survey, 2008
1=not at all corrupt, 5=extremely corrupt
Cape Verde data are not available

This detailed view provides additional information that could explain delays and high costs observed earlier for Senegal especially in the property registration and tax payment procedures.

This comparative study showed areas of business environment that Senegal needs to improve to catch up with other better performing countries. Concretely, if lessons were to be learnt from those countries, advice would be:

- to reduce significantly costs and time spent in electricity connections and property registration procedures;
- to shorten the time spent to pay taxes and to reduce the number of payments;
- to improve credit access and investors protection and;
- alleviate corruption.

Obstacles revealed by the benchmark study are listed among the top 10 business environment constraints quoted by responding firms of the World Bank Enterprise Survey for Senegal performed in 2007.

III. LITERATURE REVIEW

A look into previous publications dealing with the impact of business environment is a crucial step toward picking an approach to bring supporting evidence to this study. Since business environment is made up of a set of variables, research

dedicated to it is multidimensional. From a global perspective, Collier (2000) considers that a poor business environment leads to high transaction costs affecting mostly manufacturing industries in Africa. Bah and Fang (2010) apply the aggregation of a set of obstacles to investment climate as a tax on production and use a general equilibrium model to measure its impact on output and productivity in sub-Saharan African firms. They find significant and sizeable effect. Thus, their results show that poor business environment account for about 80% of the income per capita difference between the US and the thirty African countries of the sample. According to, Hornberger, Battat and Kuzek (2011), besides business opportunities, strong institutions and investor-friendly regulations also matter to attract foreign direct investment. Durlauf, Kourtellos and Tan (2008) also provide evidence supporting the relationship between institutions and growth.

In other respects, a series research articles dealing with the effect of competition reform policy and entry barriers are compiled by Kitzmuller and Licetti (2012). Among the publications cited in that review, the article of Jayne and Argwings-Kodhek (1997) study the impact of opening the market and eliminating price control on maize in Kenya using household survey data. The outcome is that the measure is beneficial for consumers who could save yearly an amount of 10.1 million dollars US as a result of cost reductions. Another contribution from the same series is from Ros (2011) who showed using Mexico data that encouraging competition by opening air transport and routes to low-cost entrants has a positive influence on air fares which drop up to 37%. The impact of entry barriers is measured by Fang (2009) through a competition model. Results show that entry barriers on products market lead to less competition and the recourse to less productive technology and productivity can be affected badly.

Infrastructures have also been a focus of many publications with regards to their impact on firms' performance. Thus, Dollar, Hallward-Driemeier, and Mengistae using survey data from Bangladesh, China, India and Pakistan and controlling for firm characteristics and region or country-level effects, show that power outages have a negative impact on Total Factor Productivity (TFP). Aterido and Hallward-Driemeier (2007) also focusing on power shortages conclude to negative effect on employment growth in African firms. Further contributions on the negative impact of poor infrastructures on TFP are found in Escribano and Guash (2005), Escribano, Guash and Peña (2010), and Bastos and Nasir (2004). Finance access and costs are often listed among the most important constraints faced by firms. That's the reason why numerous research articles dedicated to investigations related to this indicated have been released. As an example, Amaral and Quintin (2010) using a discrete Overlapping-Generations (OLG) model that compare the US economy to a sample of countries in terms of financial enforcement which measures the ability to direct capital towards the production sector. They bring evidence suggesting that differences in financial enforcement explain significantly income gaps across countries as they find sizeable impact on output. Gelb and al (2007) study the finance access constraint and conclude that the severity of that obstacle declines as the country's GDP level increases. But firm size also matters when it comes to credit access as demonstrated by Beck, Demirgüc-Kunt and Maksimovic (2005). Same results are obtained by Asterido, Hallward-Driemeier and Pagès (2007) using firm survey to show that smaller firms face more difficulties accessing credit and therefore turn to informal sources to finance most of their investment.

Corruption is also an important constraint which severe adverse effects can deter firms from investing. Mauro (1995) investigates the impact of corruption from cross

country analysis and finds that it lowers investment and by extension economic growth. Fisman and Svensson (2007) draw similar conclusion from a sample of Ugandan firms. They show that sales growth is significantly and negatively influenced by corruption.

IV. THE MODEL

So far, Senegal's main business environment areas that need improvement have been identified and an overview of some of the existing theories and approaches has been presented. These previous steps helped in the choice of the suitable model to quantify the impact of business environment. Therefore, the neoclassical Real Business Cycle Model in a Small Open Economy (Mendoza (1991)) is used in this paper. This approach proved satisfactory in portraying macroeconomic dynamics observed in modern open economies (Plosser 1989, Kydland and Prescott 1982, McCallum 1989). In particular, the rationale under which investment and savings adjust to smooth consumption is a result that the model successfully generates. And most importantly, it has successfully replicated key stylized facts of the US Economy during the post second war period. Business environment is introduced following Bah and Fang (2010) assumption. Thereby, poor business environment is supposed to act as a charge affecting production. Here it is introduced as a technological shock. Data from the World Bank Enterprise are going to be used to determine the business environment parameter. More details will be provided at the calibration section.

The model considers an economy populated by a large number of identical infinitely-lived individuals with preferences described as follows:

$$E\sum_{t=1}^{\infty}\beta^{t}\left(\frac{C_t^{1-\gamma}-1}{1-\gamma}\right)-AN_t$$

$$0\le\beta\le 1$$

$$\gamma>0$$

Where C_t is consumption in period t, N_t is labor, β is the discount factor and γ is the coefficient of relative risk aversion.

The evolution of capital stock is pictured by the following equation:

$$K_t = I_t + (1-\delta)K_{t-1}$$
$$0 \le \delta \le 1$$

Where K_t is the capital stock, I_t represents gross investment, δ is a constant rate of depreciation. The initial capital stock is given.

Agents have access to international financial markets where they can exchange financial assets F_t for real interest rate r_t^* with the rest of the world which mathematically formulated as:

$$F_{t+1} = (1 + r_t^*)F_t + BC_t$$
$$R_t = 1 + r_t^*$$

Where BC_t is trade balance.

Output is produced according to the following technology:

$$Y_t = Z_t K_{t-1}^{\alpha} N_t^{1-\alpha} - \Phi(K_t - K_{t-1})$$
$$\Phi(K_{t+1} - K_t) = \left(\frac{\phi}{2}\right)(K_t - K_{t-1})^2$$
$$\Phi(0) = 0, \Phi'(0) = 0$$
$$0 < \alpha < 1,\ \phi > 0$$

Where Y_t is output, Z_t represents total factor productivity and $\left(\frac{\phi}{2}\right)(K_{t+1} - K_t)^2$ is the adjustment cost of capital. The latter variable is usually introduced in the small open economy approach to limit the speed of capital accumulation. It thereby avoids excessive investment volatility in reaction to interest rate fluctuations.

The resource constraint establishes simply that on cannot consume more than earnings which means that the sum of consumption, investment and trade balance cannot exceed gross output net of adjustment costs:

$$C_t + I_t + BC_t = Y_t - \Phi\left(K_t - K_{t-1}\right)$$

Individuals maximize their utility which corresponds to solving the following program:

$$\max E\sum_{t=1}^{\infty}\beta^t\left(\frac{C_t^{1-\gamma}-1}{1-\gamma}\right) - AN_t$$

$$s.t.$$

$$C_t + I_t + BC_t = Y_t - \Phi\left(K_t - K_{t-1}\right)$$

$$Y_t = Z_t K_{t-1}^{\alpha} N_t^{1-\alpha} - \Phi\left(K_t - K_{t-1}\right)$$

$$K_t = I_t + \left(1-\delta\right)K_{t-1}$$

$$F_{t+1} = R_t F_t + BC_t$$

$$\log Z_t = \left(1-\psi\right)\log\overline{Z} + \psi\log Z_{t-1} + \varepsilon_t$$

$$\varepsilon_t \approx i.i.d.N\left(0;\delta^2\right)$$

The corresponding Lagrangian can be written as:

$$L = \max E\left[\sum_{t=0}^{\infty}\beta^t\left(\begin{array}{l}\dfrac{C_t^{1-\gamma}-1}{1-\gamma} - AN_t \\ +\lambda_t\left(R_t F_t + Z_t K_{t-1}^{\alpha} N_t^{1-\alpha} + \left(1-\delta\right)K_{t-1} - K_t - C_t - \Phi\left(K_t - K_{t-1}\right) - F_{t+1}\right)\end{array}\right)\right]$$

First order conditions or Euler equations can be straightforwardly determined by calculating the derivative of the Lagrangian with respect to C_t, N_t, K_t and λ_t and setting them to 0:

$$\frac{\partial L}{\partial C_t} = 0 = \frac{1}{1-\gamma}(1-\gamma)C_t^{-\gamma} - \lambda_t = C_t^{-\gamma} - \lambda_t \quad (1)$$

$$\frac{\partial L}{\partial N_t} = 0 = -A + \lambda_t(1-\alpha)Z_t K_{t-1}^{\alpha} N_t^{-\alpha} = -A + C_t^{-\gamma}(1-\alpha)\frac{Y_t}{N_t} \quad (2)$$

$$\frac{\partial L}{\partial K_t} = 0 \Rightarrow \lambda_t\left(1 + \Phi'(\mathrm{K_t} - K_{t-1})\right) = \beta \mathrm{E_t}\left[\lambda_{t+1}\left(\alpha Z_{t+1} K_t^{\alpha-1} N_{t+1}^{1-\alpha} + 1 - \delta + \Phi'(K_{t+1} - K_t)\right)\right] \quad (3)$$

$$\frac{\partial L}{\partial \lambda_t} = 0 \Rightarrow Y_t - \Phi(\mathrm{K_t} - K_{t-1}) = \mathrm{C_t} + \mathrm{I_t} + \mathrm{F_{t+1}} - R_t \mathrm{F_t} \quad (4)$$

Furthermore, the following equation is obtained from the definition of returns:

$$R_t K_{t-1} = \alpha Y_t + (1-\delta)K_{t-1}$$

$$R_t = \alpha \frac{Y_t}{K_{t-1}} + 1 - \delta \quad (5)$$

Now, let's just rewrite the first order conditions without the time indices to obtain the steady state:

$$A = \overline{C}^{-\gamma}(1-\alpha)\frac{\overline{Y}}{\overline{N}} \quad (6)$$

$$\overline{R} = \alpha \frac{\overline{Y}}{\overline{K}} + 1 - \delta \quad (7)$$

$$1 = \beta \overline{R} \quad (8)$$

$$\overline{C} = \overline{Y} - \delta \overline{K} + \overline{F}(1 - \overline{R}) \quad (9)$$

Once the steady state is determined, constraints and first order conditions are log-linearized according to Uhlig (1991) procedure. The principle is to use a Taylor approximation around the steady state transforming all equations to obtain approximated log-deviations from the steady state which facilitates results interpretation.

Therefore, let c_t be the logarithmic deviation of C_t from its steady state $\overline{C}$:

$$c_t = \log(C_t) - \log(\overline{C})$$

If for example $c_t = 0{,}05$, it means that C_t approximately exceed its steady value of 5%. Uhlig linearization method applied C_t yields :

$$C_t = \overline{C}e^{c_t} \approx \overline{C}(1+c_t)$$

Thus, the linearization of the resource constraint is obtained using that technique and the steady state equation (9):

$$\begin{aligned}
&\overline{C}e^{c_t} + \overline{I}e^{i_t} + \overline{F}e^{f_t} - \overline{R}\overline{F}e^{r_t+f_t} = \overline{Y}e^{y_t} - \overline{\Phi}e^{\phi_t} \\
&\overline{C}(1+c_t) + \overline{I}(1+i_t) + \overline{F}(1+f_{t+1}) - \overline{R}\overline{F}(1+r_t+f_t) = \overline{Y}(1+y_t) - \overline{\Phi}(1+\phi_t) \\
&\overline{C} + \overline{I} + \overline{F}(1-\overline{R}) + \overline{C}c_t + \overline{I}i_t + \overline{F}f_{t+1} - \overline{R}\overline{F}r_t - \overline{R}\overline{F}f_t = \overline{Y} + \overline{Y}y_t - \overline{\Phi} - \overline{\Phi}\phi_t \\
&0 = \overline{Y}y_t - \overline{\Phi}(1-\phi_t) - \overline{C}c_t - \overline{I}i_t + \overline{F}f_{t+1} - \overline{R}\overline{F}(r_t+f_t) \qquad (10)
\end{aligned}$$

So are the remaining equations:

$$\overline{K}k_t = \overline{I}i_t + (1-\delta)\overline{K}k_{t-1} \qquad (11)$$

$$y_t + \overline{\Phi}(1-\phi_t) = z_t + \alpha k_{t-1} + (1-\alpha)n_t \qquad (12)$$

$$0 = -\gamma c_t + y_t - n_t \qquad (13)$$

$$0 = E_t\left[\gamma(c_t - c_{t+1}) + r_{t+1} + \phi\overline{K}(k_t - k_{t-1})\right] - \phi\overline{K}(k_t - k_{t-1}) \qquad (14)$$

$$\overline{R}r_t = \alpha\frac{\overline{Y}}{\overline{K}}(y_t - k_{t-1}) \qquad (15)$$

This system is then solved using the method of undetermined coefficients documented in Uhlig (1991). The principle of the method is to rewrite the system as linear functions of a vector of endogenous and exogenous variables. The idea is that some variables are predetermined so given. Those are called state variables: in this paper k_{t-1} and z_t. The other variables are therefore determined by solving a quadratic matrix.

V. CALIBRATION

An advantage of this model is that it doesn't require time series but parameters need to be set to fit main features of the Senegalese economy data. Such procedure is called calibration.

So starting with γ, the risk aversion coefficient, it is evaluated at 1, consistent with previous studies (Mendoza's (1991)). Diagne and Fall (2007) estimate the capital share α at 0.35 based on a sample of Senegalese manufacturing industries. Its rate of depreciation δ is also taken from the same study and is set to be 0.1. Diagne and Fall (2007) also measure hours of labor to be 0.21 which is less than 0.3, Hansen's (1985) result for developed countries.

Let θ be the parameter of poor business environment. As mentioned earlier, it represents the sum of constraints to business environment. The main obstacles identified at the stylized facts section are electricity, corruption, access to finance, and tax payments. The World Bank Enterprise Survey (2007) provides data measuring those constraints as a loss in percentage of sales. The survey was conducted on 506 Senegalese manufacturing firms. This study considers electricity, crime and corruption, poor infrastructures and tax payment which add up to 0.15.

Furthermore, the technological term $\overline{Z}$ is set at 1. The autoregressive coefficient ρ of technological shock is estimated at 0.91 and its standard deviation δ_{ε}, 0.21. World real interest rate is calibrated at 4% (see Mendoza (1991)). The adjustment cost of capital ϕ is measured so as to reflect the volatility of investments. Simulations led to a value of 0.017. The model's parameters are summarized in table 4:

Table 4. Calibrated parameters

Risk aversion coefficient	γ	1
Capital Share	α	0.35
Capital rate of depreciation	δ	0.10
Technological factor	$\overline{Z}$	1
hours of work	$\overline{N}$	0,21
charge (poor business environment)	θ	0.15
World real interest rate	$\overline{R}$	0.04
autoregressive coefficient of the technological shock	ρ	0.91
Standard deviation of the technological shock	δ_{ε}	0.20
Adjustment cost of capital	ϕ	0.017

VI. RESULTS

Prior to generating results from the model, tests for rightness of fit needs to be performed. Therefore, observed data from Senegal are examined against those generated by the model. Table 5 indicates that correlations of output with consumption and capital calculated from real data are close to those generated by the model. Therefore, the model replicates reasonably the Senegalese economy and can now be used to measure the impact of business environment.

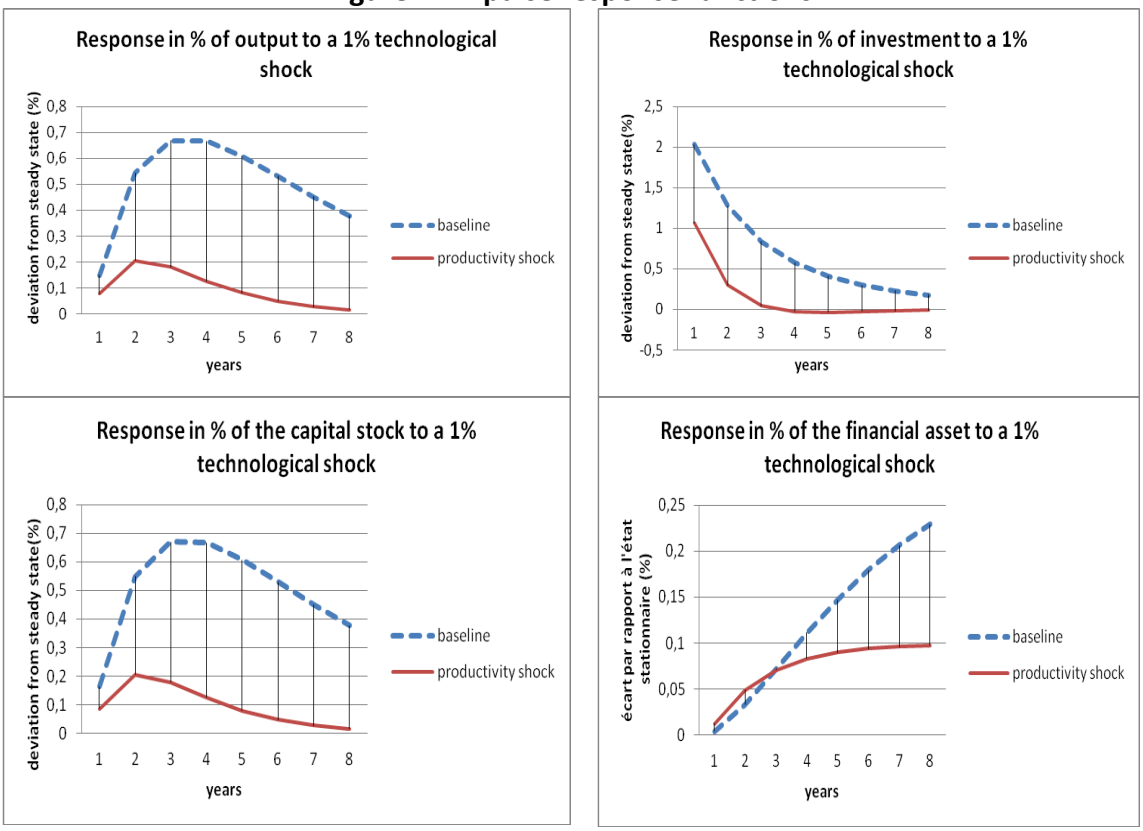
Table 5. Correlation coefficient with respect to ouput

Variables	PERIODES					
	t-1		t		t+1	
	Model	Real data	Model	Real data	Model	Real data
C	0.10	0.07	0.83	0.79	0.26	0.20
K	0.86	0.81	0.77	0.73	0.63	0.61
Y	0.87	0.84	1	1	0.64	0.63

Note : *observed series are in logarithme*

A 1% technological shock is simulated according to two scenarios. The first one is the baseline scenario. In the second scenario, conditions are worsened by a poor business environment. Figure 2 shows the impulse response functions of capital stock, investment, output and financial assets in both scenarios:

Figure 2. Impulse response functions



The simulation period is eight years. The overall view of the results shows symmetry of the scenarios. They go separate ways. The productivity shock has sizable

negative impact on capital stock. Investment which is a function of capital accumulation is also strongly affected. However, the deviation from steady state contracts as time runs. Large negative effect is also observed on output.

The adjusting behavior of savings to smooth consumption is found through individuals holding more financial assets at the beginning of the period in reaction to the productivity shock which a common feature of real business cycle models.

Table 6 shows the average impact of poor business environment:

Table 6. Impact of business environment

Average in 8 years	target variable response (en %)			
	K	I	F	Y
Z (negative productivity shock)	-79	-94	+4	-79

The average investment could have increase by 94% if constraints to business environment were eliminated. Poor business environment also accounts for 79% output loss.

VII. CONCLUSION

This paper shows sizeable impact of poor business environment measured by constraints on electricity, crime and corruption, poor infrastructures and tax payment on investment and output in Senegalese manufacturing firms. Those obstacles are priority issues to be addressed as they account for 94% and 79% losses respectively in investment and output.

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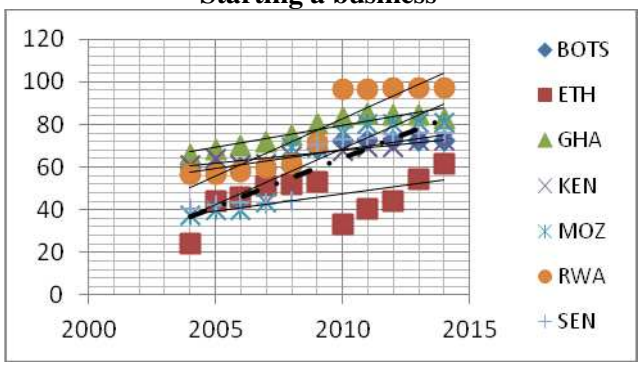
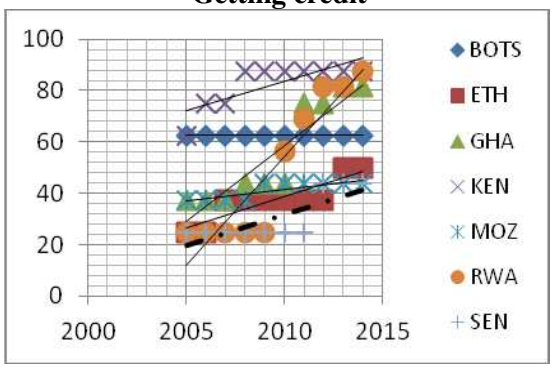
APPENDIX

Distance to frontier

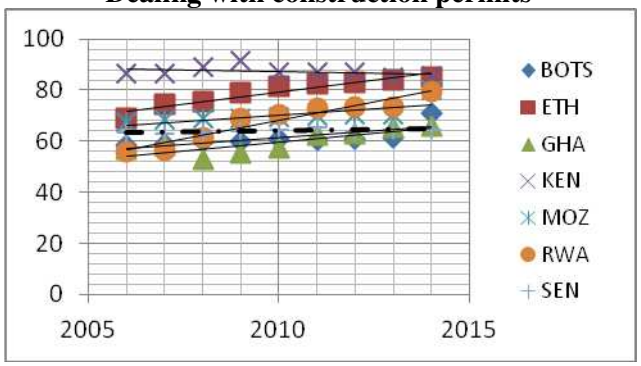
Starting a business



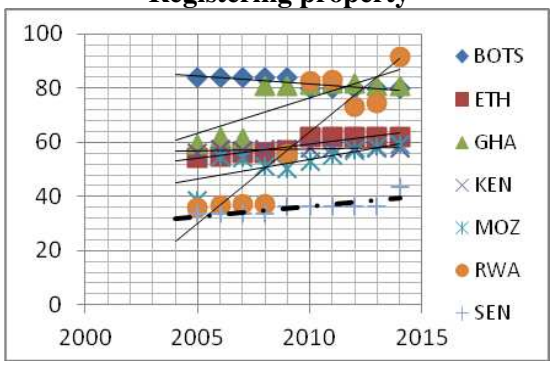
Getting credit



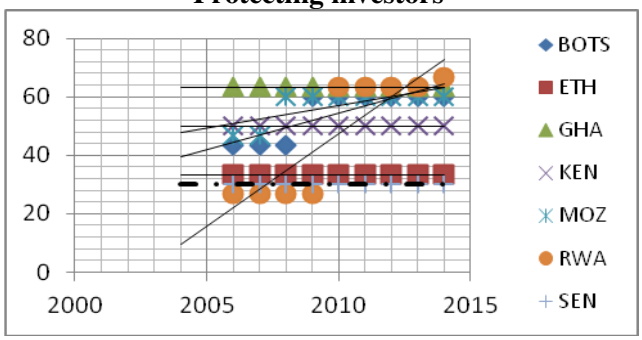
Dealing with construction permits



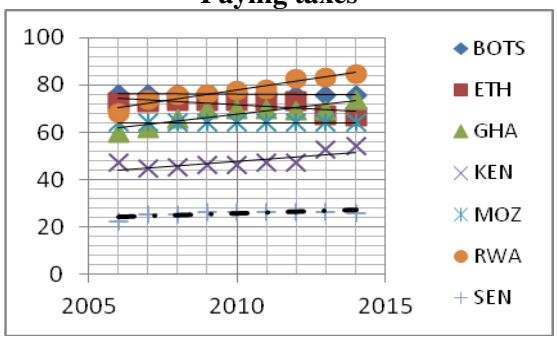
Registering property



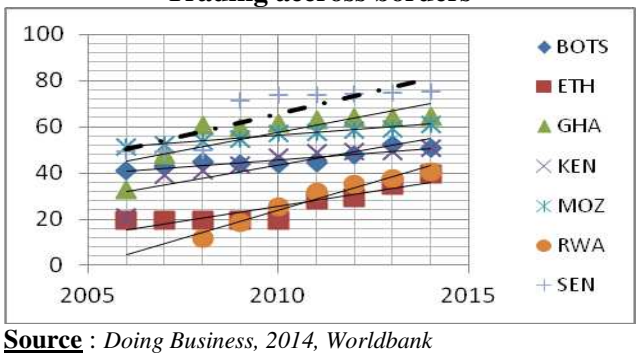
Protecting investors



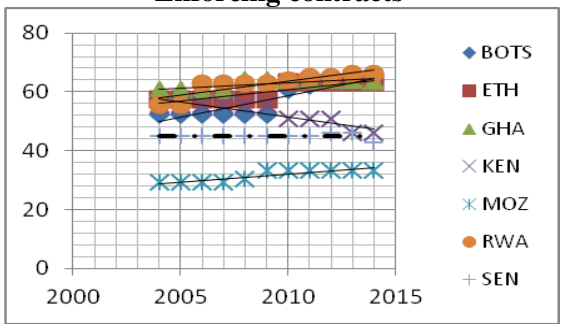
Paying taxes



Trading accross borders



Enforcing contracts

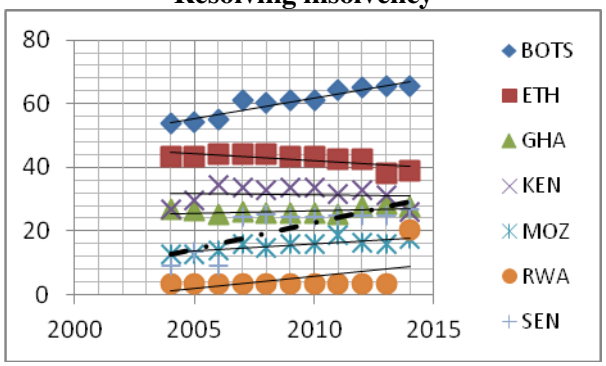


Source : *Doing Business, 2014, Worldbank*

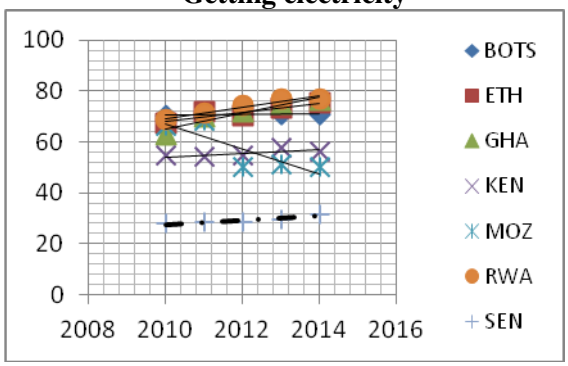
Note : *distance to frontier shows how countries improve the indicators over time. The frontier corresponds to the best performance observed. The distance ranges between 0 and 100; 0 being the lowest performance and 100 is the frontier. Senegal is compared to Botswana, Ethiopia, Ghana, Kenya, Mozambique and Rwanda.*
Dotted lines represent Senegal's performance.

Distance to frontier : continued

Resolving insolvency



Getting electricity



Source : *Doing Business, 2014, Worldbank*

Note : *distance to frontier shows how countries improve the indicators over time. The frontier corresponds to the best performance observed. The distance ranges between 0 and 100; 0 being the lowest performance and 100 is the frontier. Senegal is compared to Botswana, Ethiopia, Ghana, Kenya, Mozambique and Rwanda.*
Dotted lines represent Senegal's performance.