# Trade Unionism and Enterprise Performance in Senegal

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Bringing Rigour and Evidence to Economic Policy Making in Africa

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# Abstract

In line with efficiency wage theory, a high rate of trade unionism can be a source of higher production costs for enterprises, but also a source of enhanced efficiency. The aim of this study is to quantify the net effect of unionism on enterprise performance in Senegal. Based on data from the World Bank Enterprise Survey 2014, two models have been developed for the study: a labour productivity model and an average wage model based on the proportion of employees affiliated to a union. The study's findings show a negative relationship between trade unionism and labour productivity (performance indicator) for large enterprises. Specifically, Senegalese enterprises which have trade unions perform poorly in terms of labour productivity. However, the study also finds that the existence of a union in an enterprise has a positive effect on employee remuneration: unionized workers have higher wages than non-unionized workers.

Keywords: unions, labour productivity, wages, Senegal
JEL classification : J51, J31, J24

# 1. Introduction

It was at the beginning of the 19th century that a workers' representative movement called a union was created in Western countries (among others in France) (Morvan, 2001). A union can be characterized as an organization of employees who unite to obtain better working conditions and higher wages for their members (Lafay *et al*. 2006). In Senegal, as in other countries, collective bargaining, through unionism, for better working conditions, have traditionally taken place within enterprises, where the working conditions depend on economic sector. With the advent of a trade unionism linked to industrial growth, things are changing: labour relations are no longer limited to the characteristics mentioned above, but have taken on a new aspect by taking into account the socioeconomic dimension. We can also add the consideration of the material, moral and social interests of workers to meet their basic needs as well as the economic interests of the company. We are now in the context of professional relations.

The trends in collective bargaining have allowed the development of trade unionism in enterprises, institutions and industries owing to freedom of association. Collective bargaining is no longer limited to wages and has been extended to cover issues such as working hours, in-service training, or employment (Laroche, 2004). Trade unions have become the negotiator for the majority of their members. There is a legal framework within the enterprise that governs negotiations between a trade union and the management (Najem and Paquet, 2007). In enterprises where unions are totally absent, the management unilaterally decides on working conditions, while those with a union presence are obliged to negotiate with the union. However, in relation to this collective bargaining practice, many researchers have questioned the trade union's economic role in enterprise performance. There is much empirical work on the relationship between trade unionism and enterprise performance (for example, Freeman and Medoff, 1980, 1984; Clark, 1984, Laroche, 2004, 2006; Najem and Paquet, 2007).

The literature shows mixed results. Studies conducted in the United States of America have reported a positive effect of unionism on the performance of US enterprises. According to Freeman and Medoff (1984), the presence of a trade union in an enterprise can have beneficial effects on the latter's performance because this presence can reduce transaction costs and facilitate the process of wage determination. However, other researchers, such as Medoff and Bourguignon (2013), are of the opinion that trade unionism has negative effects because of its restrictive practices that limit the enterprises' room for manoeuvre and ultimately reduce their ability to adapt. Studies done in Great Britain and Japan have also found a negative

relationship between the presence of a trade union in an enterprise and labour productivity. This presence was found to have led to an 11% drop in productivity in Great Britain and a 13% drop in Japan (Doucouliagos and Laroche, 2003b).

In Senegal, the trade union movement was started as part of economic and social participation. The movement is present mainly in urban areas and in the formal sector where the bulk of private non-agricultural enterprises offering salaried jobs are based. However, according to the Senegalese Labour Code, trade unions are workers' organizations[1] whose sole objective is the defence of economic, industrial, commercial, agricultural and artisan interests. They are chosen by the government to participate in all aspects of labour relations, in collective bargaining, in government advisory bodies, and other matters. According to Mbodji (2009), the Senegalese government plays the role of arbitrator, which means that it is limited to ensuring that bipartite negotiations between unions and employers proceed smoothly. For example, regarding the determination of the general wage level, it is clear that as it is linked to the country's economic situation, it cannot just be the subject of bilateral discussions. To counterbalance the employers' power over employees, the government empowers unions to represent the latter collectively and supports some particular strategies taken by the unions in their bargaining with employers (Alby *et al.*, 2005). Trade unions have always been a movement that plays a very important role in Senegalese political and social life, despite the low union density in some economic sectors. The average unionization rate in Senegalese enterprises was 10.74% in 2014, against 9.02% in 2007 (World Bank, 2007, 2014). A report by the National Bureau of Statistics and Demography (Agence Nationale de la Statistique et de la Démographie, ANSD en 2015)[2] on employment in Senegal shows that the proportion of employees affiliated to a union or a workers' association is 15.1%, which points to an increase in union-affiliated workers.

The history of trade unionism in Senegal shows that the protest nature of the trade union movement found its expression in the railway workers' strikes of 1919, 1925, 1938 and 1947–1948 (Ndour, 1990). These protests were political and economic in nature.[3] The Senegalese trade union movement has been marked by many years of interaction between trade unions and political parties. Senegal has a long history of trade union activism and was one of the first hubs of the African trade union movement, with small unions under French colonial rule in the 1920s.

There are 14 groups of affiliated trade unions in Senegal. Five of these groups are members of the International Trade Union Confederation (ITUC): the National Confederation of Workers in Senegal (Confédération nationale des travailleurs du Sénégal, CNTS), the Confederation of Independent Trade Unions (Confédération des syndicats autonomes, CSA), the Democratic Union of Workers in Senegal (Union démocratique des travailleurs du Sénégal, UDTS), the National Union of Independent Trade Unions in Senegal (Union nationale des syndicats autonomes du Sénégal, UNSAS) and the National Confederation of Workers in Senegal/Force for Real Change (Confédération nationale des Travailleurs du Sénégal/Force du Changement-Authentique, CNTS/FC-A). Founded in 1969, the CNTS is the only major trade union that

is really powerful in Senegal. It is very influential in the telecommunications industry, in the extractive industries and in both the road and the rail transport industries. For its part, the CNTS/FC-A is dominant in the petroleum industry. The economic sectors in which the two confederations are dominant are key contributors to Senegal's economic development through their creation of jobs and value added.

In relation to wage increases for union-affiliated workers, a study was conducted on the impact of wage rigidity on productivity in Senegal (Diop and Séne, 2012). Its results showed that a wage increase led to a 0.94% drop in labour productivity. Najem and Paquet (2007) argue that a wage increase will lead to discrimination between employees because the union wage premiums they receive cause losses related to labour as a factor of production, which means losses in terms of productivity.

Distortions caused by the presence of unions can lead to productivity losses caused by employee strikes. Other explanatory factors for such losses have to do with the fact that many union strikes have been observed due to lack of dialogue, according to the 2014 World Bank report on the business climate of enterprises in Senegal. In 2012, the annual report of labour statistics in Senegal highlighted the existence of collective disputes within enterprises, which is a sign of overheating in the workplace. 45.8% of the reasons for conflicts between employees and employers are related to working conditions while 39.6% are related to wages and bonuses. In Senegal, unionized workers tend to earn more than their non-unionized counterparts. This wage difference can be attributed to the existence of non-wage benefits for unionized workers that compensate for their low income (Rama, 2000). Fall and Ndiaye (2006) reported that in large and small and medium-sized enterprises the remuneration policy was deemed to be fair by 90% of the human resource managers while it was deemed not fair by 51% of the workers and 57% of their representatives. These differences can be attributed to the fact that the workers belong to different unions (Fall and Ndiaye, 2006).

## 1.1 Background

While competitiveness has become a major issue with the advent of globalization, in sub-Saharan Africa, and particularly in Senegal, there is still a low level of business productivity, thus leading to a low rate of wealth creation (Diene *et al.*, 2015). An analysis of labour productivity has revealed that the secondary sector has experienced relatively high productivity levels, but not the tertiary sector. A possible explanation for the low labour productivity in the latter sector may be the strong presence of informal activities or the low cost of labour.

A 2014 World Bank report on the Senegalese private sector showed that business performance in Senegal deteriorated in the previous years in terms of real sales growth. Between 2011 and 2013, real sales increased by 2.4% compared to a stronger annual growth rate of 9% over the 2003–2006 period. However, despite the low growth rates, business performance in Senegal was still comparable to that of other countries

in sub-Saharan Africa, where the annual sales growth was 2.5% on average.

Based on the preceding paragraphs, the question to be asked is whether the presence of a trade union in an enterprise is a source of underperformance of Senegalese enterprises. This study's aim is to contribute to the empirical literature, which is still quite limited in Africa in general and in Senegal in particular, on the role of unions in enterprises, that is, on their contribution to enterprise performance. The study will address the issue of the role of unions in job and wealth creation and the survival of enterprises in Senegal. It is differentiated from the existing literature by the context being studied, namely Senegal.

The study's general objective is to analyze the link between trade unionism and the performance of enterprises in Senegal. Specifically, it will focus on the relationship between the presence of a union in an enterprise and the wage levels of its employees and the impact of the union on the performance of the enterprise according to the latter's size. The study is based on the assumption that in a context of increased freedom of association, workers, through various rounds of collective bargaining, will succeed in securing a wage increase. In other words, the presence of a union in an enterprise will have a positive effect on its employees' wage levels. A further assumption is that factor and output markets are far from competitive, which justifies a separate analysis of productivity and wages. Finally, the study hypothesizes that the incidence of trade unionism on labour productivity is non-linear. If the level of trade unionism is enhanced from a low level it will lead to enhanced productivity. However, when the unionization rate reaches a threshold it becomes detrimental to productivity, because unions will tend to have a monopoly on wage-related and other demands. And if these demands are not met, the unionized workers will go on strike, which is likely to cause a loss in the enterprise's productivity.

This paper is structured as follows: Section 2 discusses trade unionism in terms of its goals and its effect on enterprise performance; Section 3 describes the methodology, data and models to be used; Section 4 presents the results of the estimations; and Section 5 concludes with economic policy recommendations.

# 2. Literature review

This section reviews the existing literature and debates between different economists on the issue of unionism within an enterprise. The review takes two approaches: a theoretical approach relating to the nature and goals of a trade union, and an empirical approach related to the research done on the effect of trade unionism on the performance of enterprises.

There are numerous studies on the predominant effect of unionism on wage levels. By definition, unions are employee organizations that unite in order to obtain better working conditions and higher wages for their members (Lafay *et al.*, 2006). According to standard economic analysis, a trade union is considered to be an agent that defends the interests of its members and has a monopoly on wage levels. A model of union monopoly forces enterprises to change their capital per worker and to improve the labour quality until labour productivity is equal to the wage rate wanted by unions (Freeman and Medoff, 1984).

Wage bargaining theory tells us that this type of bargaining allows the relationship between employers and employees to continue, which fosters good labour management and encourages employees to improve their productivity. The trade union as the "voice" of its members, which is how it is viewed from an institutional approach to bargaining, allows the workers to express their wishes freely.

"On the labour market the 'voice' discusses with the boss the working conditions that should be improved to prevent the workers from leaving the company. Trade unions in large industrial economies (especially in large enterprises) offer to workers opportunities for alternative negotiations with the management" (Freeman and Medoff, 1980: 508).

According to Freeman and Medoff (1984), the collective expression of the workers' wishes fosters an improvement in the working relationship and contributes to increased productivity levels. The "exit" option in the labour market, which is the voluntary mobility on the part of the workers, leads to a reduction in staff turnover costs and, thus, constitutes a union's beneficial effect in an enterprise. However, in some situations, unions can cause a reduction in productivity through the restrictive practices arising from their monopoly power (Freeman and Medoff, 1984).

In wage efficiency theory, downward wage rigidity can have negative effects on enterprise performance, especially on profits, because of high labour costs. Awarding the efficiency wage to the insiders (i.e. members of the union) offers no benefit to an enterprise because the enterprise will have to sustain the wage cost with a low profit. Yet the presence of a union in an enterprise has a negative effect on the latter's performance because of the workers' strikes, which  are very costly. The

efficiency wage practice is only effective in a competition model where employees are remunerated based on their marginal productivity. However, wage efficiency theory also shows a positive relationship between the wage level and productivity: indeed, the efficiency wage enables workers to earn a wage that is higher than the equilibrium wage fixed on the labour market, which, in turn, will push them to increase their levels of effort (which is unobservable) and, hence, their labour productivity.

There is disagreement between two authors, namely Dunlop (1944) and Ross (1948), about the typical nature and goals of a trade union. According to Dunlop (1944), a trade union is, in its nature, a monopoly whose goal is to sell workers' services. That is, the union fights for the interests of its members not only by agitating for higher wage levels but also for improved working conditions for its members. The monopoly nature of a union enables it to secure higher wages and, hence, greater economic profitability for itself, which will arise from its members' contributions. That is why the author considers a trade union to be an economic agent.

Ross's (1948) vision of a union is different from Dunlop's (1944). He asserts that "a union is a political agency operating in an economic environment whose leaders' primary goal is survival and institutional growth". The trade union's wage-related choice is not well specified, because it is first of all necessary to have an internal decision-making discussion between the community and its leaders.

A union's effect on enterprise performance (an effect arising from the social climate, that is, the relationship between the union and the management) is of paramount importance for economists. However, the effect of collective bargaining between the union and the enterprise is not static (Freeman and Medoff, 1984); it varies according to circumstances. If the relationship between the employer and the employee is good, it could have a positive impact on both the wage level and labour productivity. However, if it is not good, the enterprise will have difficulty achieving high productivity. All this goes to show that the presence of a union in an enterprise has a real effect on the latter's production process.

Given a trade union's interests in and effect on an enterprise's production process, the question arises as to what the union's contribution is within the enterprise; that is, on the latter's performance, especially in terms of labour productivity. Unions always agitate for higher wages through the traditional channel of influence. To meet the unions' demands (for a wage increase), the enterprise will also seek to increase the level of marginal product of labour by increasing the capital-labour ratio (Clark, 1976). A wage increase for workers always results in an increase in wage costs, relative to the equilibrium wage. This is likely to have a negative effect on the enterprise's competitiveness (performance) in the labour market because of the ensuing increase in production costs (Laroche, 2006).

A theoretical analysis shows that the presence of a union in an institution has different effects, due to the fact that each economist's vision about the effect of unionism in enterprises is different: some economists have argued that this effect is positive (Freeman and Medoff, 1984), while others have argued that it is negative.

At the empirical level, the situation is different: data collected for the 1998

RÉPONSE survey in France by Laroche (2004) produced the same results as those reported in Coutrot (1996). Both showed that the presence of a union was positively correlated with labour productivity in enterprises where there were at least two unions. This suggests that having many unions has a positive effect on labour productivity. In the same vein, Bryson et al. (2017) explain the effects of union density on enterprise productivity and employee wages in Norway: unions can take advantage of their increased bargaining power by making the most of some of this additional productivity through a higher union wage premium. However, this cannot happen in high-productivity enterprises where unions place a ceiling on wage increases.

The empirical studies conducted by Doucouliagos and Laroche (2003a, 2003b) on unionism and productivity growth reported a positive relationship between the two in the United States and a negative one in the United Kingdom (Doucouliagos and Laroche, 2003a). In the case of the USA, a positive association was established, especially in the country's manufacturing industry, using a meta-analysis regression method, which enabled the researchers to quantify the association between unionism and productivity. Conflicting results have always been observed more on the theoretical than the empirical level. In all those studies, the presence of a union was observed to have a positive effect (+4%) and, thus, to contribute to improving worker productivity. However, other researchers have found a negative relationship between the presence of a union and labour productivity: this is the case in many studies conducted in Great Britain (-11%) and Japan (-13%) (Doucouliagos and Laroche, 2003b: 664). Unionism in the two countries was found to contribute to a reduction in profitability (i.e. a drop in productivity).

Research has also been carried out on trade unionism in enterprises in Asian countries, for example in Japan by Morikawa (2010). The author sought to study the relationship between unionism and enterprise performance in Japan by focusing on profitability and labour productivity both in large enterprises and SMEs, and both in the manufacturing and non-manufacturing sectors. Morikawa's (2010) study found that the presence of a union in an enterprise had a statistically and economically significant positive effect on its productivity, an effect that can be explained by the fact that the presence of a union has a positive effect on workers' wages, and, hence, on productivity. In the same vein, Lu *et al.* (2010) found that trade unionism had a positive and significant effect on the labour productivity of Chinese enterprises. In relation to output, it was observed that unionism increased benefits for the employees and, thus, increased employment. Bester and Petrakis (2004) analyzed the relationship between the wages and productivity of a monopolistic enterprise that was engaged in innovation by improving productivity through a re-allocation of labour costs. They found that the differences in wages depended on the productivity that did not affect productivity growth at a steady state. The impact of unionism on flexible remuneration and performance was of interest to Origo (2009).

From a theoretical point of view, it can be predicted that pegging wages to performance can produce both incentives and selection effects, making older workers more productive and attracting the most skilled workers from outside. In addition,

productivity gains can be shared with workers by awarding them higher wages, and heterogeneous effects can be expected from union density. Estimates based on union density suggest that incentive effects are more prevalent in unionized small enterprises (Origo, 2009). Since most employees belong to unions, it would be important to study enterprise performance management in the unionized workplace (Brown and Warren, 2011). In relation to a reduction in wage inequalities, unions consistently dominate the reductions in enterprises and between workers. However, an analysis of labour productivity done in OECD countries has shown that the emphasis placed on a comprehensive wage reduction is an obstacle to productivity growth in a unionized organization (Vernon, 2015), but promotes it in a segmented form of unionism. Another explanatory factor for the presence or influence of a union on productivity may be dismissals arising from absenteeism. Dismissals pit the union against the management. Retaining the most opportunistic workers will affect labour productivity (García-Olaverri and Huerta, 2011).

Based both on the literature review and on Senegal's institutional framework on the rights of unionized members (according to article L.6 of the Senegalese labour code), this study seeks to establish whether the presence of unions in enterprises in Senegal has an effect on their performance.

# 3. Data and method of analysis

## 3.1 The Data

The data used in this study were taken from the World Bank's Enterprise Survey conducted in Senegal in 2014. It concerned 601 enterprises distributed over four regions of the country (Dakar, Kaolack, Saint-Louis, and Thiès). This database provides detailed information on enterprises and is representative of the economic sectors of the Senegalese economy. It further contains enough data to allow both a statistical and an econometric analysis.

Table 1 indicate that small-sized enterprises are the most representative (68%), followed by medium-sized (22%), and large (8%) enterprises, and finally by micro-enterprises (3%). Most of these enterprises belong to the service industry, except for the large ones, which are in the majority (52%), belong to the manufacturing industry.

Table 1: Distribution of enterprises in Senegal according to size and economic sector

| Size of enterprise | Number | (%) | Economic sector | |
| --- | --- | --- | --- | --- |
| | | | Manufacturing (%) | Services (%) |
| Micro-enterprises | 16 | 3 | 38 | 63 |
| Small-sized enterprises | 405 | 68 | 39 | 61 |
| Medium-sized enterprises | 131 | 22 | 44 | 56 |
| Large enterprises | 48 | 8 | 52 | 48 |
| Total | 601 | 100 | | |

Source: Compiled by the author, based on data from the World Bank's Enterprise Survey, 2014

The data in Table 2 below show that the bulk of the enterprises are based in the Dakar area. A good number of them, both large and medium-sized, are based in the Thiès region. Micro-enterprises (25%) are also found in the Kaolack region.

Table 2: Distribution of different enterprises across the four regions of Senegal

|  | Percentage (%) of enterprises across the regions | | | |
|---|---|---|---|---|
| Size of enterprise | Dakar | Kaolack | Saint-Louis | Thiès |
| Micro-enterprises | 69 | 25 | 0 | 6 |
| Small-sized enterprises | 53 | 14 | 13 | 21 |
| Medium-sized enterprises | 78 | 5 | 1 | 17 |
| Large enterprises | 85 | 4 | 0 | 10 |

Source: Compiled by the author, based on data from the World Bank's Enterprise Survey, 2014

Table 3 shows that, on average, the unionization rate in enterprises in Senegal is 6%. The rate is highest in large enterprises (34%), followed by medium-sized ones (8%). Economic sectors are different, and the turnover is highest in the large enterprises (average sales: CFAF 21,460M), as is the case for the rate of employment creation (386 jobs created, on average) and also of wage costs.

Table 3: Statistical analysis: Distribution of enterprises, unionization rate, sales, jobs created, and wage costs

| Size of enterprise | Unionization rate (%) | Sales (CFAF millions) | Jobs created | Wages (CFAF millions) | Productivity |
|---|---|---|---|---|---|
| Micro-enterprises | 0 | 8 | 3 | 2 | 2,715,624 |
| Small-sized enterprises | 1 | 197 | 9 | 12 | 20,938,327 |
| Medium-sized enterprises | 8 | 5,723 | 37 | 98 | 208,800,000 |
| Large enterprises | 34 | 21,460 | 386 | 1,070 | 80,958,876 |
| Total | 6 | | | | |

Source: Compiled by author, based on data from the World Bank's Enterprise Survey, 2014

Table 4 shows that trade unionism in companies is only prevalent in 6% of enterprises surveyed. The average proportion of unionized workers in this group is 64.3%, that is about 1 in 10 workers in the entire economy. It transpires from the survey that 353 companies (about 50%) did not provide a response to the question, which means that there are missing data. Despite the small proportion of the enterprises where trade unions exist, the table still shows differences in terms of sales, wages, labour productivity and jobs created. It also shows that, on average, there is a higher turnover in enterprises with a union presence than in those without, that the former

employed 118 workers on average against 32 workers for the latter, and that their wage costs are also higher. It can therefore be concluded that enterprises with unions are more productive than those without.

Table 4: Comparative analysis: Sales, costs and distribution of employment and labour productivity

| Trade union | Number of enterprises | % | Sales (CFAF millions) | Wages (CFAF millions) | Productivity | Jobs created |
|---|---|---|---|---|---|---|
| Present | 213 | 35 | 1,362 | 48 | 10,266,998 | 32 |
| Absent | 34 | 6 | 16,910 | 454 | 94,565,898 | 118 |
| No response | 354 | | | | | |
| Total | 601 | | | | | |

Source: Compiled by the author, based on data from the World Bank's Enterprise Survey, 2014

## 3.2 Analysis of Relationship between Trade Unionism and Enterprise Performance

Econometric analysis will enable us to study the effect of trade unionism on the performance of Senegalese enterprises. To this effect, the study will estimate two models: one for labour productivity (performance indicator) and another for average wages. For the labour productivity model, the Cobb-Douglas function will be used. A logarithmic function (ln) for productivity will be used, as suggested by Brown and Medoff (1978), as they deem it to be the tool most used to make estimations. The Cobb-Douglas production function is the following:

$$Y_i = A K_i^{\alpha} (L_{in} + c L_{iu})^{1-\alpha},$$

(1)

where $Y_i$ = production, $K_i$ = capital, $L_{in}$ = amount of non-unionized labour, and $L_{iu}$ = amount of unionized labour. A is a constant, while $\alpha$ is the elasticity of production for the factor "capital" and $(1-\alpha)$ the elasticity of production for the factor "labour in enterprise i". Parameter c represents the difference in productivity between the non-unionized labour factor and the unionized labour factor. When c>1, the former factor is more productive than the latter. When c<1, the unionized labour factor is less productive than the non-unionized one. The model above is equivalent to a model into which a logarithmic function (ln) for productivity has been introduced, as suggested by Brown and Medoff (1978). We get the following model by dividing L by total employment:

$$\frac{Y}{L} = \frac{A K^{\alpha}}{L} (Lin + c Liu)^{1-\alpha}$$

(2)

$$\frac{Y}{L} = \frac{AK^a}{L^aL^{1-a}}(Lin + cLiu)^{1-a} \tag{3}$$

$$\frac{Y}{L} = \frac{AK^a}{L^a}\frac{(Lin+cLiu)^{1-a}}{L^{1-a}} \tag{4}$$

$$\frac{Y}{L} = A\left(\frac{K}{L}\right)^a\left[\frac{Lin+cLiu}{L}\right]^{1-a} \tag{5}$$

the total employment of enterprise i $L = L_n + L_u$

$$\frac{Y}{L} = A\left(\frac{K}{L}\right)^a[1 + (c-1)Liu/L]^{1-a} \tag{6}$$

After linearizing the model in Equation 6, we get the following model:

$$\text{Ln}\left(\frac{Y}{L}\right) = \text{ln}(Ai) + \alpha\text{ln}(Ki/Li) + (1-\alpha)(c-1)\text{ln}\left(\frac{Liu}{L}\right), \tag{7}$$

$(Liu/L)$ is unionism density, in other words, the unionization rate; that is the proportion of workers affiliated to a trade union; $Yi/Li = yi$ is labour productivity; $(1-\alpha)$ is the difference in productivity of unionized workers, and $(1-\alpha)(c-1)$ is the difference in productivity of unionized enterprises.

$$\text{Ln}(yi) = \text{ln}(Ai) + \alpha\text{ln}(Ki/Li) + \beta txsyndi \quad (2') \text{ where } \beta = (1-\alpha)(c-1).$$

The following equation control variables have been introduced into the equation, which are likely to have a positive influence on the productivity of enterprises, following the model used by Laroche (2004):

$$ln(y_i) = \alpha_0 + \alpha_1 txsynd_i + \alpha_2 txsynd_i^2 + \alpha_3 (txsynd_i * taille_i) + \alpha_4 taille_i + \alpha_5 (equ_i) + \alpha_6 ln(K/L)_i + \varepsilon_i$$

Similarly, average wage is used in this study to represent employee remuneration (as a ratio of the wage bill to number of employees). To measure the effect of trade unionism on the wage level, the following model will be used:

$$ln(w_i) = \beta_0 + \beta_1 txsynd_i + \beta_2 txsynd_i^2 + \beta_3 (taille_i) + \beta_4 (equ_i) + \beta_5 ln(K/L)_i + \mu_i \tag{8}$$

The choice of variable is based on the existing literature (Laroche, 2000, 2004; Morikawa, 2010):

- $y_i$ is the labour productivity for enterprise i, as represented by the ratio of its turnover to labour volume;
- $w_i$ is the average wage in the enterprise, as represented by the ratio of wages to labour volume;
- $txsynd_i$ represents the unionization rate, that is, the proportion of workers affiliated to a trade union;
- $\boldsymbol{txsynd_i^2}$ is a quadratic formulation that makes it possible to capture a possible threshold effect;
- $eqi_i$ is the number of skilled workers;
- $(K/L)_i$ is the capital intensity of the enterprise i; that is, the ratio of capital to labour volume;
- $\boldsymbol{(txsynd_i * taille_i)}$ represents the interaction between the unionization rate and the size of the enterprise; it makes it possible to test whether the latter is a transmission channel and also to test the differentiated impact;
- $taille_i$ is the size of the enterprise i; it is a binary variable that takes the value of 1 if it is a large enterprise, and 0 if otherwise; and
- $\varepsilon_i$ and $\theta_i$ are the error terms.

First, using the ordinary least squares (OLS) method, the study will first carry out a regression of the labour productivity variable on the variables of interest and on the control variables after checking all the assumptions of the OLS regression. Then a coefficient significance test (Student's t-test) will be done to test the effect of each variable on labour productivity at a given threshold, after which a test of the heteroscedasticity of the errors will be done as the study uses instantaneous section data. The existence of bias will necessitate the use of the generalized least squares (GLS) method. The existence of such bias presupposes a difference between the value of a population parameter and its value within a sample. Bias can influence the estimations because of missing data. A GLS regression corrects standard deviations. Second, the "average wage" variable will be regressed on the explanatory variables and all the traditional tests done for the previous regression will also be done for this second regression.

# 4.  Results

## 4.1    Relationship between Trade Unionism and Labour Productivity

The estimation of the parameters of the labour productivity equation performed on a sample of Senegalese enterprises produced the following results: trade unionism was found to have no significant effect on the labour productivity of Senegalese enterprises (see Table 5). This means that no correlation was found between the unionization rate and labour productivity. Even the unionization rate squared did not indicate any effect on labour productivity.

However, there is interaction between the size of the enterprise and the unionization rate: the study found that the presence of a union in large enterprises had a negative effect at the 5% threshold. It can be concluded that the overall effect is mixed in large enterprises because the high unionization rate does not lead to enhanced labour productivity. The negative link between union density and the productivity of large companies can be justified by strikes due to a lack of dialogue between unions and management. It can also be attributed to the employees' working conditions and the job insecurity resulting from the lack of a contract for some employees. Unions negotiate better benefits and get an increased number of employment contracts signed (Lu *et al.*, 2010). The effect of control variables on labour productivity is the following: capital intensity and skilled labour were found to have no influence on labour productivity. However, the size of the enterprise was found to have a positive effect.

Table 5: Relationship between unionization rate and labour productivity

| Variables | Coefficients | P-value |
| --- | --- | --- |
| txsynd | 0.013 | 0.566 |
| txsynd2 | 0.000 | 0.969 |
| taille*txsynd | 0.023 | 0.049** |
| ln(K/L) | 0.407 | 0.121 |
| equ | 0.012 | 0.129 |
| taille | 1.280 | 0.045** |
| constant | 9.229 | 0.020 |

| | |
|---|---|
| $R^2$ | 0.3240 |
| Prob > F | 0.0000 |

$^*$ p < 0.1, $^{**}$ p < 0.05, $^{***}$ p < 0.01; the dependent variable is ln (labour productivity)

## 4.2    Relationship between Unionization Rate and Wage Levels

Based on the probabilities related to the study's estimations, the results show a significant effect of a union presence in the enterprise on wage levels: union presence is positively correlated with wage levels. All things being equal, the statistical results show that wages are higher in enterprises where there are unions. However, this positive relationship shows a non-linear effect of the unionization rate: while there is a threshold effect on this rate, this has no effect on wage levels, even though at a certain level the effect is positive. Employees who are members of a union have a higher probability of securing higher wages through union claims made to management. These results corroborate those found by Laroche in 2004, Coutrot in 1996 and Najem and Paquet in 2007. For example, Coutrot (1996) reported a wage increase of 3% in organizations where there was at least one union representative. There, therefore, exists a causal link between the presence of a union in an enterprise and a wage increase. Najem and Paquet (2007) underline the difference in hourly wages between unionized and non-unionized employees (USD 21.60 vs. 18.50).

It can be concluded that collective bargaining in Senegal has an effect on employee wage levels. The observation that there was a difference between unionized employees' wages and non-unionized wages can be attributed to this collective (wage) bargaining. At the economic level, wages represent a significant part of labour costs. There is indeed an interdependence between wages and other competitiveness factors such as labour productivity. The literature reveals that unions can exert a strong position vis-à-vis the employer, which reflects the unions' monopolistic nature (Dunlop, 1944).

Unionized employees are more opposed to a reduction in wages than non-union ones. This opposition may encourage the employer to recruit skilled labourrather than un unskilled . If the employer increases wages due to pressure from the union, that might have a negative effect on labour productivity if wages are an endogenous variable related to other factors such as collective bargaining, the employees' education level and their experience. Control variables, namely skilled labour and enterprise size, were found to be significant, which means that the average wage is strongly and positively correlated with them. However, capital intensity was found not to have an effect on wage levels.

Table 6: Relationship between unionization rate and wage levels

| Variables | Coefficients | P-value |
|-----------|--------------|---------|
| txsynd | 0.026 | 0.154 |
| txsynd2 | 0.000 | 0.025** |
| ln(K/L) | 0.036 | 0.726 |
| equ | 0.020 | 0.027** |
| taille | 2.597 | 0.000** |
| constant | 15.058 | 0.000 |
| $R^2$ | | 0.4796 |
| Prob > F | | 0.0000 |

$^{*}$ $p < 0.1$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$; the dependent variable is ln (average wages)

# 5.  Conclusion

This study analyzed the effect of unionism on the performance of Senegalese enterprises. It found that unionism had no effect on labour productivity (performance indicator) overall. However, this overall effect masks differences, as the lack of effect was observed mainly in large enterprises. The relationship was found to be negative between unionization rate and the labour productivity of large enterprises. These results thus show a positive relationship between the presence of a union in an enterprise and the latter's remuneration of its workers.

The study showed that in Senegal a trade union movement existed that had the power to influence, through wage bargaining, the employer's decisions. A strong union presence in enterprises is likely to make them pay high wages to employees, which in turn is likely to lead to a low level of labour productivity in those enterprises. Indeed, the study reported an increase in wages at a time when productivity was relatively low in these enterprises. This clearly suggests that the (unionized) employees of large enterprises are a potential cause of low productivity. It is noted that performance (productivity and competitiveness) is related to employee labour.

Implementing an economic policy based on the present study's results is highly recommended. Reducing the unionization rate in enterprises would greatly contribute to enhanced performance on their part. At the same time, smaller enterprises should be encouraged to grow into larger ones in order for them to achieve higher levels of productivity.

All these policies will only contribute to enhanced performance in enterprises if they do not promote the freedom of association for their employees, which is impossible because the workers' right to be part of a trade union is recognized by the labour code in Senegal. The idea of not promoting the freedom of association will provoke further debate because it is a fact that the unions will always agitate for a wage increase depending on the performance of the economy. And if the management agrees to the workers' demands, the enterprise will have to sustain more costs arising from the negative effect of unionism on its performance, unless the union decides to support the management's perspective of improving productivity.

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# Annex 1

## Test of Collinearity between Variables

pwcorr syndicat emploiqual taille secteur intens synd2 tailsynd, star(.01) print(.05)

[NB: syndicat : trade-union ; emploi: employment; taille: size ; secteur : sector]

|            | syndicat | emploi~l | taille   | secteur | intens  | synd2   | tailsynd |
|------------|----------|----------|----------|---------|---------|---------|----------|
| syndicat   | 1.0000   |          |          |         |         |         |          |
| emploiqual | 0.3252*  | 1.0000   |          |         |         |         |          |
| taille     | 0.3754*  | 0.4773*  | 1.0000   |         |         |         |          |
| secteur    |          |          |          | 1.0000  |         |         |          |
| intens     | 0.2649*  |          |          |         | 1.0000  |         |          |
| synd2      | 0.9634*  | 0.2892*  | 0.3789*  |         | 0.2444* | 1.0000  |          |
| tailsynd   | 0.6694*  | 0.4707*  | 0.5915*  |         | 0.1344  | 0.6745* | 1.0000   |

Estimation of Labour Productivity Model

reg lnpro syndicat synd2 tailsynd intens taille secteur
Note: "secteur" omitted because of collinearity

| Source   | SSdf       | MS         |
|----------|------------|------------|
| Model    | 170.955968 | 5          | 34.1911937 |
| Residual | 635.596737 | 185        | 3.43565804 |
| Total    | 806.552705 | 190        | 4.24501424 |

| | |
|---|---|
| Number of obs | = 191 |
| F(5, 185) | = 9.95 |
| Prob > F | = 0.0000 |
| R-squared | = 0.2120 |
| Adj R-squared | = 0.1907 |
| Root MSE | = 1.8536 |

| lnpro    | Coef.      | Std. Err. | t     | P>|t| | [95% Conf. Interval] |           |
|----------|------------|-----------|-------|-------|----------------------|-----------|
| syndicat | 0.0202802  | 0.0189995 | 1.07  | 0.287 | -.0172034            | .0577639  |
| synd2    | 0.0000199  | 0.000223  | 0.09  | 0.929 | -.0004201            | .0004599  |
| tailsynd | -.0164958  | 0.0109111 | -1.51 | 0.132 | -.0380219            | .0050302  |
| intens   | 1.80e-08   | 1.29e-08  | 1.40  | 0.164 | -7.44e-09            | 4.35e-08  |
| taille   | 2.224487   | .5220652  | 4.26  | 0.000 | 1.19452              | 3.254454  |
| secteur  | 0 (omitted)|           |       |       |                      |           |
| cons     | 15.06226   | .159722   | 94.30 | 0.000 | 14.74715             | 15.37737  |

# Estimation without Activity-sector Variable

reg lnpro syndicat synd2 tailsynd lnintens emploiqual taille

| Source | SS | df | MS | | Number of obs | = | 100 |
|--------|-----|----|-----|---|---------------|---|-----|
| | | | | | F(6, 93) | = | 7.43 |
| Model | 163.380281 | 6 | 27.2300468 | Prob > F | = | 0.0000 |
| Residual | 340.893353 | 93 | 3.66551993 | R-squared | = | 0.3240 |
| | | | | | Adj R-squared | = | 0.2804 |
| Total | 504.273634 | 99 | 5.09367308 | Root MSE | = | 1.9146 |

| lnpro | Coef. | Std. Err. | T | P>\|t\| | [95% Conf. Interval] | |
|-------|-------|-----------|---|---------|----------------------|---|
| syndicat | 0.012739 | 0.0268756 | 0.47 | 0.637 | -.0406307 | .0661087 |
| synd2 | 0.0000108 | 0.0003128 | 0.03 | 0.973 | -.0006104 | .000632 |
| tailsynd | -0.0232508 | 0.0186388 | -1.25 | 0.215 | -.0602637 | .0137622 |
| lnintens | 0.407456 | .0797756 | 5.11 | 0.000 | .2490374 | .5658746 |
| emploiqual | 0.0118182 | 0.009778 | 1.21 | 0.230 | -.0075989 | .0312353 |
| taille | 1.280337 | 0.9041962 | 1.42 | 0.160 | -.5152172 | 3.075892 |
| cons | 9.229527 | 1.176525 | 7.84 | 0.000 | 6.893181 | 11.56587 |

{B}
Omitted Variable Test

estat ovtest, rhs
(Note: syndicat^2 dropped because of collinearity)
(Note: syndicat^4 dropped because of collinearity)
Ramsey RESET test using powers of the independent variables
   Ho: model has no omitted variables
      F(10, 175) =   1.05
       Prob > F =   0.4064

Robust Estimation

reg lnpro syndicat synd2 tailsynd lnintens emploiqual taille, robust
Linear regression                    Number of obs   =   100
                                     F(6, 93)     =   7.33
                                     Prob > F   =   0.0000
                                     R-squared   =   0.3240
                                     Root MSE   =   1.9146

| | | Robust | | | | |
|---|---|---|---|---|---|---|
| lnpro | Coef. | Std. Err. | T | P>\|t\| | [95% Conf. Interval] | |
| syndicat | 0.012739 | 0.0220978 | 0.58 | 0.566 | -.0311428 | .0566209 |

| | | | | | | |
|---|---|---|---|---|---|---|
| synd2 | 0.0000108 | 0.0002733 | 0.04 | 0.969 | -.000532 | .0005536 |
| tailsynd | -0.0232508 | 0.0116488 | -2.00 | 0.049 | -.046383 | -.0001186 |
| lnintens | 0.407456 | 0.2603305 | 1.57 | 0.121 | -.1095087 | .9244207 |
| emploiqual | 0.0118182 | 0.0077179 | 1.53 | 0.129 | -.003508 | .0271444 |
| taille | 1.280337 | 0.6265181 | 2.04 | 0.044 | .0361964 | 2.524478 |
| cons | 9.229527 | 3.913579 | 2.36 | 0.020 | 1.457934 | 17.00112 |

# Annex 2: Estimation of Wage Model

reg lnsal syndicat synd2 lnintens emploiqual taille

| Source | SS | df | MS | | Number of obs | = | 98 |
|--------|-----|-----|-----|---|---|---|---|
| | | | | | F(5, 92) | = | 16.96 |
| Model | 186.179909 | 5 | 37.2359817 | | Prob > F | = | 0.0000 |
| Residual | 202.020216 | 92 | 2.19587191 | | R-squared | = | 0.4796 |
| | | | | | Adj R-squared | = | 0.4513 |
| Total | 388.200124 | 97 | 4.00206314 | | Root MSE | = | 1.4818 |

| lnsal | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval] | |
|-------|-------|-----------|---|-------|---------------------|---|
| syndicat | -.0260146 | .0209417 | -1.24 | 0.217 | -.0676066 | .0155774 |
| synd2 | .0004625 | .0002446 | 1.89 | 0.062 | -.0000234 | .0009484 |
| lnintens | .0360221 | .0755484 | 0.48 | 0.635 | -.1140234 | .1860677 |
| emploiqual | .0202307 | .0068589 | 2.95 | 0.004 | .0066083 | .033853 |
| taille | 2.597254 | .60571 | 4.29 | 0.000 | 1.394261 | 3.800246 |
| _cons | 15.05794 | 1.12307 | 13.41 | 0.000 | 12.82743 | 17.28845 |

Usual tests

estat vif

| Variable | VIF | 1/VIF |
|----------|-----|-------|
| synd2 | 17.00 | 0.058824 |
| syndicat | 16.87 | 0.059275 |
| emploiqual | 1.50 | 0.665182 |
| taille | 1.37 | 0.732270 |
| lnintens | 1.07 | 0.932100 |
| Mean VIF | 7.56 | |

Test of Heteroskedasticity of Errors

The Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
    Ho: Constant variance
    Variables: fitted values of lnsal
        chi2(1)   =   0.03
    Prob > chi2  =  0.8706

Ramsey test

estat ovtest, rhs
(Note: syndicat^2 dropped because of collinearity)
(Note: syndicat^4 dropped because of collinearity)
The Ramsey RESET test using powers of the independent variables
    Ho: model has no omitted variables
          $F(10, 82) =$    3.54
           Prob > F =    0.0006
The model has no omitted variables.


## Robust Estimation

reg lnsal syndicat synd2 lnintens emploiqual taille, robust

Linear regression            Number of obs   =      98
                             F(5, 92)      =    17.01
                             Prob > F      =   0.0000
                             R-squared    =   0.4796
                             Root MSE    =   1.4818

| lnsal | Coef. | Std. Err. | t | Robust P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| syndicat | -.0260146 | .0180886 | -1.44 | 0.154 | -.0619401 | .0099109 |
| synd2 | .0004625 | .0002023 | 2.29 | 0.025 | .0000607 | .0008642 |
| lnintens | .0360221 | .1024054 | 0.35 | 0.726 | -.1673638 | .2394081 |
| emploiqual | | .0202307 | .0090016 | 2.25 | 0.027 | .0023527 .0381086 |
| taille | 2.597254 | .539703 | 4.81 | 0.000 | 1.525357 | 3.669151 |
| cons | 15.05794 | 1.523201 | 9.89 | 0.000 | 12.03273 | 18.08315 |

# Notes

1 Senegalese Labour Code, see section on "Object of workers' unions and the way they are constituted", Article L.6.

2 See the Senegal National Employment Survey (Enquête nationale de l'emploi au Sénégal, ENES, 2015).

3 Equality in terms of race and salaries between French and African workers.

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