An estimation of the level of Core Labour Standards between 1970 and 1995: towards a time-series index of Core Labour Standards*

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Abstract

One of the main problem in the empirical literature on Labour Standards is the difficulty to have relevant and reliable data on the effective level of labour standards in a large sample of countries. Different researchers work to build robust indexes of labour standards, focusing on different aspects: fundamental Rights at work (Kucera 2001) or core labour standards (Bazillier 2008), Decent Work (Ghai 2003) or on specific labour standards: Kucera (2002) on freedom of Association, Edmonds and Pavcnik (2004) on child labour, Busse and Spielmann (2003) for discrimination and Busse and Braun (2003) for forced labour. However, due to a lack of data, all these indicators are only country-level and do not include a temporal analysis. This article is a first attempt to build a panel data model of labour standards. With the use of a large number of comparative time series of labour standards, we build estimations of the effective level of labour standards thanks to different indicators on child labour, freedom of association, discrimination and number of ILO ratifications. Then we propose an aggregation of these different indicators thanks to the method of Principal Component Analysis. We build this aggregate indicator for 123 countries between 1970 and 1995. This index could be very useful to study the dynamical effects of core labour standards.

Keywords: Labour Standards, Principal component analysis, index
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Abstract

One of the main problem in the empirical literature on Labour Standards is the difficulty to have relevant and reliable data on the effective level of labour standards in a large sample of countries. Different researchers work to build robust indexes of labour standards, focusing on different aspects: fundamental Rights at work (Kucera 2001) or core labour standards (Bazillier 2008), Decent Work (Ghai 2003) or on specific labour standards: Kucera (2002) on freedom of Association, Edmonds and Pavcnik (2004) on child labour, Busse and Spielmann (2003) for discrimination and Busse and Braun (2003) for forced labour. However, due to a lack of data, all these indicators are only country-level and do not include a temporal analysis. This article is a first attempt to build a panel data model of labour standards. With the use of a large number of comparative time series of labour standards, we build estimations of the effective level of labour standards thanks to different indicators on child labour, freedom of association, discrimination and number of ILO ratifications. Then we propose an aggregation of these different indicators thanks to the method of Principal Component Analysis. We build this aggregate indicator for 123 countries between 1970 and 1995. This index could be very useful to study the dynamical effects of core labour standards.

Résumé

Un des principaux problèmes dans la littérature sur les normes du travail est la difficulté d'obtenir des données pertinentes et fiables concernant le niveau effectif de normes du travail pour un large nombre de pays. Différents auteurs ont travaillé la construction d'indicateurs robustes portant sur les droits fondamentaux des travailleurs (Kucera 2001), sur le niveau de normes fondamentales de travail (Bazillier 2008), sur le travail décent (Ghai 2003) sur des normes de travail plus spécifiques: Kucera (2002) sur la liberté d'association, Edmonds and Pavcnik (2004) sur le travail des enfants, Busse and Spielmann (2003) sur la discrimination et Busse and Braun (2003) sur le travail forcé. Néanmoins, du fait de problèmes de données, ces indicateurs ne comportent pas de dimension temporelle. Ce papier constitue une première tentative de construire une base de données en panel sur les normes du travail. A partir d'un large nombre de séries temporelles concernant les normes du travail, nous construisons une estimation du niveau effectif de normes du travail grâce à des indicateurs individuels mesurant le niveau de travail des enfants, de discrimination, de liberté d'association et de niveau de ratifications de conventions de l'OIT. Nous proposons ensuite une méthode d'agrégation par analyse en composante principale (ACP). Cet indicateur est construit pour 123 pays entre 1970 et 1995. Il pourra être utile l'analyse dynamique des effets des normes du travail.

1 Introduction

There is a growing interest concerning the issue of labour standards and a growing number of country level indicators of labour standards and workers rights. Kucera (2004) argues it is likely attributable to several factors such as the effects of labour standards on international competitiveness and the growing interest in so-called socially responsible investment.

A lot of researches worked on this issue and proposed different indicators. We can identify two main problems. In a first period, the empirical literature on labour standards was based on unclear and heterogeneous definition of Labour Standards. The first problem was a problem of *definition*. Rodrik (1996), for example, constructed measures of labour standards including: (1) total number of ILO conventions ratified by countries ; (2) a more focused measure of ratifications of ILO conventions relating to "basic workers rights" ; (3) a measure of democracy encompassing indicators of civil liberties and political rights ; (4) an indicator of problems of legislation or enforcement of standards affecting child labour; (5) statutory hours of work; (6) days of annuals leave with pay in manufacturing; and (7) the percent of the labour force unionised. Van Beers (1998) build an index of labour standards including measures of working time, contracts, minimum wages, and worker's representational rights. We will see that these definition of labour standards is broader than the one we will use, according to the international consensus on the issue.

Labour Standards can be defined by the global principles and rules governing work and professional conditions (OECD 1996). They are multifaceted and may vary from country to another depending on the stage of development and political, social and cultural conditions and institutions. Most of labour standards will so depend on given national circumstances (Stern 2000). However, there is now an international consensus[1] considering that certain core rights should be globally recognized and protected (Leary 1996). OECD and ILO distinguished four core labour standards: (1) prohibition of forced labour, (2) freedom of association and the right to organize and bargain collectively, (3) elimination of child labour exploitation, and (4) non-discrimination in employment. OECD justifies these choices by two arguments: they are a fundamental part of the Human Rights and their respect carries more efficiency. ILO speaks about fundamental rights of workers which can be applied everywhere, whatever the stage of development. We will then focus on this definition of *Core* labour standards and build our indicators following this definition. Our index of core labour standards cannot take into account the cost standards (minimum wage, working time, social security...), as defined by Aggarwal (1995). Because of the international consensus, the problem of definition is weaker now (see for example Martin and Maskus (2001) or Kucera (2002)).

The second problem is the lack of temporal perspective. Different indicators have been built on fundamental Rights at work (Kucera 2001), core labour standards (Bazillier 2004) (Bazillier 2005a) or Decent Work (Ghai 2003). But these indicators do not include a temporal analysis. It was only possible

[1] See the conclusion of the Social Summit of Copenhagen (1995), the WTO declaration of Singapore (1996) and the ILO declaration in fundamental rights of workers (1998)

to measure the effective level of labour standards for one period. Thanks to these indicators, a lot of studies has been done in cross-section but it is not possible to study the dynamical effects of labour standards. It is a problem if we argue it is possible to distinguish short term effects (on competitiveness[2]) and long-term effects (on economic growth)[3].

We also assume to measure the effective enforcement of core labour standards and not the legislation concerning these standards. This *de facto* approach is preferred to the *de jure* consideration because of the frequent gap between the legislation and the reality (Child labour is illegal in a lot of countries but still exists). Of course, there is a link between legislations and enforcement of the norms. But it cannot be considered as the only way to measure it effectively. That is why we propose to take into account the ratification of ILO's convention only as a part of our global index. Ghai (2003) proposes an alternative methodology. It is a very interesting approach based on the lack of decent works in several fields. However, the notion of decent work is broader than the one of fundamental rights of workers or the one of core labour standards. Kucera (2001) proposes a complete methodology to measure fundamental rights at work. We propose a complementary measure with an aggregation strategy.

Considering the existing problems in the literature concerning the measurement of these standards, this paper focuses on a new aggregated indicator measuring the effective level of core labour standards. We will first introduce the indicators measuring each of the standards and then present the scalar index.

2 Presentation of the indicators

We propose four distinct indicators measuring child labour, freedom of association and collective bargaining (FACB), discrimination and the number of ratification of ILO conventions. Unfortunately, for problem of data, it is not possible to build an indicator measuring the evolution of forced labour between 1970 and 1995. Busse and Braun (2003) provide an useful first attempt to compare forced labour across countries. These data are built thanks to Antislavery and ICFTU (2001), ILO (2001) and US Department of State (2002). These informations are not available with such details for the previous year. Even if we tried to build it thanks to the annual report of the Department of State, for example, there would have been an obvious bias in the estimation since the information sources used are much less complete for earlier period. For each of these indicators, we try to build an indicator included between 0 (good level of labour standards) and 1 (very weak labour standards). We keep the same definition of each indicators among time in order to have comparable data across different periods. All these indicators are available between 1970 and 1995 with an interval of 5 years between each data.

2.1 Child labour (CL)

The most relevant measure of child labour is the percentage of children between 10 and 14 years old who works (WB 2005). However, there is an evident statistical bias for a significant number of countries. We

[2]However, we have to notice there is no empirical evidence on the negative effects of core labour standards on competitiveness (Martin and Maskus 2001) (Kucera and Sarna 2004b).

[3]See Bazillier (2005b) for a survey on this issue.

consider a country with a very low percentage of children who goes to primary school has a very high probability to have a problem of child labour. Thus, we adjust the percentage of children between 10 and 14 years old who works by the percentage of children who does not go to primary school (UNESCO 1998 and 1999). This adjusted indicator is an attempt to correct the statistical bias. It is recommended by Bescond, Chataignier, and Mehran (2003) and used by Kucera and Sarna (2004a). Bescond, Chataignier, and Mehran (2003) argue that, taken as a worldwide average, the number of children combining work with school is nearly the same (9.9 % in 2000) as the number of children neither at work nor school (10.1%)[4]. We use the gross rather than net enrollment rate as it si available for a larger number of countries.

We then obtain the following formula:

$$CL_{t,i}^{adjusted} = \max(CL_{t,i}^{raw}; \frac{CL_{t,i}^{raw} + Percentage\ of\ children\ who\ does\ not\ go\ to\ primary\ school_{t,i}}{2}) \quad (1)$$

With $CL_{t,i}^{raw}$ the percentage of working children between 10 and 14 years old for country i and time t. The value we obtain is an ordinal value and cannot be seen as a 'percentage' of working children.

We obtain values between 0.002 (United Kingdom) and 0.81 (Burkina Faso) in 1970 and between 0 (nearby all developed countries) and 0.61 (Somalia) in 1995. We observe a global decline of child labour between 1970 (with a mean value of $CL = 0.23$) and 1995 ($CL = 0.14$).

2.2 Freedom of Association and collective bargaining (FACB)

There are three main qualitative indicators to estimate at the global level the Freedom of Association and collective bargaining: OECD (1996), FreedomHouse (2005) and Kucera (2004)[5]. The most linked to the ILO definition of FACB is certainly the one of Kucera (2004). Unfortunately, the period considered is only mid-1990s (based on violations occurring between 1993 and 1997 inclusive). It is based on three main sources: the International Confederation of Free Trade Union' (ICFTU) *Annual Survey of Violations of Trade Union Rights*, the United States State Department's *Country Reports on Human Rights Practices*, and the ILO's *Report of the Committee on Freedom of association.* Kucera[6] considers it is not possible to build time series versions of the data for earlier periods with this method. This is because the information sources used are much less complete for earlier periods. But also, one must account for information bias in the more recent period. These reports now focus on violations rather than good things, this create a systematic bias toward showing that FACB rights have gotten worse over time, whether they have in fact or not. It is more or less the same problem for the OECD indicator. It seems very difficult to build it in the same ways for a such large period.

The Freedom House Civil Rights indicator is more adapted for time series analysis. It provides annual data from 1972 to present, updated annually, furthermore for 201 countries. The main problem is the

[4]Estimation of ILO (2002)

[5]See Kucera (2004) for a schematic survey of qualitative indicators pertaining to freedom of association and collective bargaining rights

[6]correspondence with the author

definition of Civil Rights is much more broader than the one of FACB rights. It includes different measures of "freedom of expression and belief", "association and organizational rights", "rule of law and human rights", and "personal autonomy and economic rights". Under "association and organizational rights", one of the checklist items relates directly to FACB rights: *"Are there free trade unions and peasant organizations or equivalents, and is there effective collective bargaining? Are there free professional and other private organizations?"*. Under the category "personal autonomy and economic rights", there is one checklist item referring to union leaders: *"Is there equality of opportunity, including freedom from exploitation by or dependency on landlords, employers, union leaders, bureaucrats, or other types of obstacles to a share of legitimate economic gains?"*. Kucera (2004) notes that *"the score on the checklist item relating to FACB makes up only 1/14 of the overall civil liberties index and that scores are not available for individual checklist items"*. But the same author[7] consider is a pretty good indicator to explore time series variation. Furthermore, several authors such as Rodrik (1996) already used these indicator to measure FACB rights in a time-series analysis.

We assume to not take into account the quantitative aspect of FACB rights, such as the unionization rate. ILO provides international data on this but the international comparison still is very difficult. Moreover, the unionization rate can be very high in countries in which freedom of association is weak (unique union, compulsory of union membership..) or low in countries in which freedom of association is good. Other tools such as the number of strikes brings other problems. We can consider that a country in which the number of strikes per worker is high is a country in which FACB rights are good. But on the other way, countries with a very old tradition of social dialog and social negotiation will not have a lot of strikes despite of a very high level of FACB rights.

We only retain the Freedom House Civil Right (FHCR) indicator as a proxy of the effective level of FACB rights. The data are included between 0.1 and 0.7 for all periods[8]. Contrary to the child labour, the global level of FACB rights stays almost constant among time. The mean of the value of our indicator is 0.42 in 1970 against 0.39 in 1995. However, we observe a significant improvement of the FACB rights between 1985 and 1990. Moreover, there are a lot of evolutions of the indicator as the national level. But there is not a global trend of improvement of such rights.

2.3 Discrimination (DISCRI)

We assume that discrimination is a multidimensional phenomena with a problem of discrimination in employment linked to a problem of discrimination in education. We use three indicators to measure discrimination. For discrimination in education, we combine the *ratio of young literate females to males (% ages 15-24)*[9] and *the ratio of school enrollement females to males for primary and secondary school*[10] in order to obtain the index $DISCRI_EDU$. Both data are not available for all the countries. When we have missing values, we only retain the variable available. For each of these two variables, we build

[7] Correspondence with the author.
[8] To homogenize the different indicators, we divide by 10 the value of FHCR for each country
[9] source: WB (2005)
[10] source: UNESCO (1998 and 1999)

an index included between 0 and 1. (0 represent a ratio of 1 between female and male which mean a strict gender equality). In the first serie of data (ratio of young literate females to males), the missing values are mainly for developed countries. Observing the data of litteracy rate for all the population in this countries, the rate is for all the periods closed to 100%. We can assume these country has a ratio of young litterate females to male closed to 1. For these countries, the missing values are not problematic because the ratio of school enrollement females to males can be seen as a good proxy for the discrimination in employement. Moreover, we control that the two variables have the same evolution in time. If the indicator of the ratio of young literate females to males seems to be structurally superior to the one concerning school enrollement, the evolution of these two variables are parralel.

The other dimension of discrimination is the discrimination in employment. For this, we use the percentage of female in total active population. This variable is used by Busse and Spielmann (2003). It is also a part of the Standardized Index of Gender Equality (SIEGE) built by Dijkstra (2002). Ghai (2003) argues the employment rates reflect disparities between females and males concerning the employment access. It is also one of the indicators proposed by Anker, Chernyshev, Egger, Mehran, and Ritter (2003) and Bescond, Chataignier, and Mehran (2003). More precisely, the labour market's participation of women reflects gender inequality more than discrimination[11].

We make the same transformation in order to have an index ($DISCRI_EMPLOYEMENT$) included between 0 and 1 with 0 represents a perfect equality between females and males in total active population[12].

Unfortunately, for a considerable number of developing and even developed countries, there are no meaningful wage data or consistent wage data over time at hand. In particular, wage data distinguished by sex is lacking. Therefore, we cannot include income data in our indicator.

The aggregated indicator of discrimination (DISCRI) is the simple mean between $DISCRI_EDU$ and $DISCRI_EMPLOYEMENT$. We observe a global decline of discrimination among time. In 1970, the mean of DISCRI is 0.2827 against 0.1639 in 1995. In 1970, the index DISCRI is included between -0.10 (Lesotho[13]) and 0.84 (Oman). In 1995, the index DISCRI is included between Ghana (-0.03) and Pakistan (0.51).

2.4 Number of Ratifications

As noticed in introduction, we assume to measure the effective enforcement of core labour standards and not the legislation concerning these standards. However, the number of ILO conventions ratified gives

[11] As noticed by Busse and Spielmann (2003), *in contrast to the gender wage gap and differences in access to education, inequality in labour market participation rates does not necessarily involve gender discrimination, as females may choose not to work or to work fewer hours if they take care of children or other family members. Discrimination in access to jobs, in job promotion or wages, on the other hand, may lead to a reduction in the female labour supply, thereby signaling discrimination too. As we cannot determine whether differences in labour market participation rates are voluntary or not, we prefer to use the term gender inequality rather than discrimination.*

[12] $Indicdiscrimination Labour = \frac{(50 - \%female in total active population) \times 2}{100}$

[13] For a significant number of African countries, the school enrollment and literacy rates are superior for woman. It explained the very low value of the index DISCRI for these countries.

an information of the political will of the State regarding the respect of International Labour Standards. Moreover, we make a distinction between ILO conventions and *core* conventions[14] giving a more important weight to the core conventions.

For each year, we build an index included between 0 and 1 with 0 a value for a country which ratified all the conventions and core conventions available at this date.

The formula used to build the indicator NR is:

$$NR_{i,t}^{raw} = \frac{N_{1,i,t} + (N_{2,i,t})^2}{N_{1,t}^{tot} + (N_{2,t}^{tot})^2} \tag{2}$$

With $N_{1,i,t}$ the number of ILO conventions ratified by the country i at the time t, $N_{2,i,t}$ the number of *core* conventions ratified by the country i at the time t, $N_{1,t}^{tot}$ the total number of ILO conventions available at time t [15], $N_{2,t}^{tot}$ the total *core* conventions available at time t. In this index, we take into consideration the denunciation of a ILO conventions (reducing the number of conventions ratified by the country) and exclude of our analysis the outdated conventions.

In order to have comparable data with the other indexes, we propose a transformation of our index NR^{raw}.

$$NR_{i,t} = \frac{1 - NR_{i,t}^{raw}}{2} \tag{3}$$

We then obtain an index included between 0 (for a country which ratified all the conventions available) and 0.5 (for a country which ratified none of these conventions). Observing the descriptive statistics of this variable, we have an index with a mean and standard deviation comparable with the other indexes of our indicators.

We must be aware about several problems[16] that we try to minimize. The first element is the time factor, e.g. the year when a convention was adopted against the year when the country became member state of the ILO and had the possibility to ratify. To minimize this problem, we adopt a lag of 5 years between the year the country became member state of the ILO and the year we calculate the first index NR for this country. However, we also consider the fact to not become a member of ILO is also a political symbol giving an information about the small interest of the country regarding to the workers right. Therefore, if a country did not become member of ILO five years after the creation of the country or the independence, we consider this country did not ratified any conventions and we give the value $NR_{i,t}^{raw} = 0$. For example, Gambia became member of ILO in 1995, 40 years after the independence (1965). Then, between 1970 and 1995, we assume $NR_{GAMBIA,t}^{raw} = 0$ [17].

[14] There are eight core conventions corresponding to the four core labour standards. For a complete list, see Annex 1.

[15] From ILO experience a period of at least 5 years after adoption is needed to qualify the ratification behaviour for a convention. Therefore, we include a convention in $N_{1,t}^{tot}$ 5 years after its adoption by the ILO conference.

[16] raised by Christiane Lubbe, ILOLEX and NATLEX database administrator in a corresponding with the author.

[17] Nevertheless, we have to think what does it mean for a country to become member of the UN system? It is true that membership means after all to pay a contribution and even a small amount is still a lot of money for some countries. However, we consider the benefits to be a member of the UN system are superior to the cost of the financial contributions. If not, why such a large number of least developed countries decided to become member of UN?

The second problem is the conventions being automatically denounced by ratification of a new convention or conventions revised and no longer open for ratification. For this, ILO used to study the "influence of the promotion of Fundamental Conventions on the ratification behaviour of the up-to-date conventions for the same period". Therefore, they identify a list of conventions that can be studied. The conventions excluded are the the outdated instruments, the instruments to be revised, the instrument subject to a request for information. We only take into consideration the up-to-date conventions.

We have also to bear in mind that the results of our calculation is only another numerical expression like the number of ratifications itself is. For the interpretation of these figures, we should take into consideration the political[18], cultural or religious situation in the country, its administrative structure, and the observations made by the Committee of Experts concerning the application of conventions[19].

The index NR is constant over time. The mean of NR was 0.362 in 1970 against 0.352 in 1995[20]. in 1970, the index is included between 0.178 (France) and 0.5 (for seven countries). In 1995, the same index is included between 0.116 (Spain) and 0.5 (for three countries).

3 The aggregated indicator of Core Labour Standards

The main goal is to find a correct measure of the *global* enforcement of core labour standards. The easiest way to obtain this would be to sum the different indexes. However, this choice is not completely satisfactory because it will introduce a bias in the global measure of these standards for two main reasons:

- Summing each index of each standard to obtain a scalar index would mean that each norm has the same explanatory power to explain the global level of workers right. We have a different hypothesis considering that the discriminating power of each standards could differ.
- We have to take into consideration the difficulty to obtain good data, without statistical bias for each standard. As we already noticed, there is a real problem of data and imperfect information. If we suppose the existence of a 'common tendancy', here the global enforcement of core labour standards, we have to isolate the effects of each standard of this common tendancy, and delete all the other effects (statistical bias or measure of a different information). Data analysis is a good tool to fulfill this kind of goal by isolating the common factors between different variables.

We have different indexes measuring different aspects of labour standards. We want to find a good and a global index of the level of enforcement of workers right and not the level of enforcement of each of these

[18]For example, federal states such as the United States, Canada or Australia claim that they are not able to ratify all conventions due to their legal procedure. However, even if it is true, there is also another political aspect that cannot be explained only by the federal character of the state. For example, in the NAFTA, there is a list of international labour standards included in the agreement. It was decided to not retain the ILO conventions but some specific criteria.

[19]However, concerning the observations made by the Committee of Experts, there is a temporal bias. For the same reasons raised by Kucera concerning the Committee on Freedom of association, the information sources used are much less complete for earlier periods

[20]After 1995, we observe an improvement in the ratification behaviour of the countries (NR=0.32). This can be explained by the ILO declaration on the fundamental rights at work and the work of promotion of the core labour standards done by ILO.

standards. The global level of workers right is unobserved. Principal Component Analysis can provide this measure.

3.1 Principal Component Analysis

Component factor analysis is one of the several factor models. Like the other model of factor analysis, it aim is to pattern the variation in a set of variables common or unique. One of the use of PCA is to reduce a mass of information to an economical description.

We can represent the data in a matrix X with n rows (the n countries) and p columns (the p different initial conditions variables). Graphically, we can represent the n countries in a p dimensional space. The distances[21] between the n row points in the p dimensional space is a perfect representation of the similarities between the row in the matrix X. The art of principal component analysis is to find a lower dimensional space (the factorial space) in which we project the row points and which retains almost all of the distances between the rows.

Therefore, the best space is the space which maximizes the dispersion of the row points projected:

$$Max_H \sum_i \sum_{i'} d_H^2(i, i')$$

And we can demonstrate that it is the same as maximizing $\sum_i d_H^2(i, G)$ with H the space of projection and G the centroid. In the general case, we have to consider that the row points are weighted because of their importance. The mass is p_i (with $\sum p_i = 1$) and we maximize $\sum_i p_i d_H^2(i, G)$ which is the projected inertia (variance). Therefore, we found the space which maximizes projected inertia.

The lower dimensional space which exists is a one dimension graph. Let's imagine this defined by a vector u. The projection of a row point on the direction defined by u is:

$$\psi_i = \sum_{j=1}^{p} x_{ij} u_j$$

So, the inertia of all the points projected on u is:

$$\sum_{i=1}^{n} p_i (\sum_{j=1}^{p} x_{ij} u_j)^2 = \lambda$$

If we have to found the space which maximizes the inertia, the objective is to found the vector u which maximizes λ. u is the eigenvector and λ the eigenvalue. u is the line on which the variance is maximal. It remains variability which is not captured by the first factor. Therefore we continue and define another vector that maximizes the remaining variability. We can proceed a third time and more if its is necessary. First, note that the variability remaining is less and less important because all the time we find a vector which maximizes the inertia. Second, because each consecutive factor, i.e. line, is defined to maximize variability which is not explained, consecutive factors are orthogonal (because they are uncorrelated).

[21] The Euclidean distance between countries i and i' is used: $d^2(i, i') = \sum_{j=1}^{p} (x_{i,j} - x_{i',j})^2$

Table 1: Eigenvalues PCA

Factor	Eigenvalue	Difference	Proportion	Cumulative
1	2.03396	1.17982	0.5085	0.5085
2	0.85415	0.22534	0.2135	0.7220
3	0.62880	0.14572	0.1572	0.8992
4	0.48308	.	0.1208	1

The fundamental idea is that if variables are correlated with each other, there is redundancy and the number of axes can be reduced.

Remembering that one of the aims of principal component analysis is to reduce the number of variables, a first question is: until when we have to extract consecutive factors? The choice is not clear-cut. To select the number of factors to extract, two commonly used criteria are the Kaiser criterion and the scree (or Cattell) test. The Kaiser criterion expresses the idea that if a factor explains more than the original variable, we extract it. As the sum of the eigenvalues of the p variables are equal to p, we consider factors with eigenvalues greater than one. The other method, the scree test, is a graphical one. In x-coordinate we put the number of eigenvalues, in y-coordinate, the value. We obtain a decreasing function (the factors explain less and less variability so the eigenvalue are decreasing). The point where the break is the most important is the number give the number of eigenvalues to extract.

3.2 PCA and the aggregate indicator of Core Labour Standards

Table 1 gives the eigenvalues found with PCA made on our four variables (CL, FACB, DISCRI, NR). According to the two criteria, it is possible to retain only the first factor to have a good description of the global level of *fundamental rights of workers*.

It is then possible to endogenously determine the weight of each variable in the aggregated index of core labour standards (factor1). Table 2 gives the results obtained. The first column gives the *factor loadings* which are the coefficient of correlation between each of the variables and the factor. We observe a higher correlation of our aggregate index with child labour and Freedom of association. The correlation is less high with discrimination. The second column gives the *communality* for each variable. It corresponds to the percentage of variation of the indicator which is linked to the factor[22]. The communalities are higher for child labour and freedom of association. This results gives an estimation of common tendencies in the evolution of each labour standards. We observe that discrimination can have an independent evolution, not linked to the global evolutions of core labour standards. We also justify our *de facto* approach, preferred to the *de jure* consideration because of the frequent gap between the legislation and the reality. The evolution of ratification behaviour is only imperfectly linked to the effective evolution of core labour standards.

[22]The communality for each variable is the square of the loading multiplied by 100.

Table 2: Factor Analysis

Variable	Factor 1	Communality	Uniqueness	Weights
Child Labour (CL)	0.80036	0.64058	0.35942	
Freedom of Association (FACB)	0.80214	0.64343	0.35657	
Discrimination (DISCRI)	0.58064	0.33714	0.66286	
ILO ratifications (NR)	0.64251	0.41282	0.58718	

Table 3: Core Labour Standards Index

Rank	Country	Year	LS	Rank	Country	Year	LS
1	Norway	1995	-2.9712	726	Somalia	1970	2.8527
2	Norway	1990	-2.9610	727	Afghanistan	1985	2.9557
3	Spain	1990	-2.9351	728	Oman	1980	2.9711
4	Sweden	1995	-2.9046	729	Nepal	1975	3.0669
5	Norway	1985	-2.8908	730	Afghanistan	1975	3.1123
6	Sweden	1990	-2.8841	731	Afghanistan	1980	3.1242
7	Finland	1995	-2.8783	732	Saudi Arabia	1970	3.1558
8	Norway	1980	-2.8492	733	Nepal	1970	3.3923
9	Finland	1990	-2.8445	734	Oman	1975	3.42
10	France	1990	-2.8430	735	Oman	1970	4.1953

The aggregate index takes the values from -2.97 (Norway in 1995) to 4.070 (Oman in 1970). The table 3 gives the 10th best and worst values of our index. The table 4 gives the descriptive statistics of LS. We observe a constant improvement of labour standards among time. However, the inequality of labour rights (given by the standard deviation of our index) is constant between 1970 and 1990. We observe a significant reduction of the standard deviation between 1990 and 1995 but we cannot conclude on a possible new trend of reduction of labour rights inequalities. Otherwise, we can see that the reduction of the standard deviation for the last period can be explained by a slower improvement of the labour standards in countries which already have a good level of labour standards. This can be explained by the nature of the labour standard studied here. The *core* labour standards cannot be improved indefinitely. At a certain level, a country respect the *core* standards and that's it. It is in confirmity with the ILO justification of the definition of core labour standards: *it corresponds to the fundamental rights of workers which can be applied everywhere, whatever the stage of development.*

Table 4: Statistics of LS

Year	Mean	Min	Max	Standard Deviation
1970	0.3805	-2.3504 (Norway)	4.1953 (Oman)	1.43
1975	0.2741	-2.5156 (France)	3.4187 (Oman)	1.3970
1980	0.0912	-2.8492 (Norway)	3.1242 (Afghanistan)	1.4063
1985	-0.0441	-2.8908(Norway)	2.9556 (Afghanistan)	1.4195
1990	-0.2943	-2.9667(Norway)	2.7800 (Equatorial Guinea)	1.4081
1995	-0.4166	-2.9712(Norway)	2.4752 (Afghanistan)	1.3063

4 Strengths and limitations of the aggregate indicator of Core Labour Standards

There are several criteria that are useful in assessing indicators (Bollen and Paxton 2000). Here we follow Kucera (2004) in the criteria retained to evaluate our aggregate indicator.

The criteria are the following:

- **Definitional Validity**: Is the definition used to construct the indicator consistent with the phenomena it aims to measure?
- **Sufficient grades of variation**: Is the indicator sufficiently finely graded to capture important dimensions of variation?
- **Reproducibility**: To what extent will different evaluators be able to consistently arrive at the same results?
- **Transparency**: How well can a score and its constituent elements be traced back to individual information sources?
- **Evaluator Bias**: Do scores reflect the bias of evaluators, with, for example, evaluators favoring countries that are more like their own?
- **Information bias and other problems with information sources**: Do the sources contain systematically more information on some groups of countries than others, such as by regions or language?

4.1 Definitional Validity

The goal is to have different indicators based on the ILO core conventions.

The Child Labour indicator is based on ILO conventions 138 (minimum age) and 182 (worst form of child labour). The convention 138 states that the minimum age cannot be inferior to 15 (14 in some

specific cases). Our measure focus on the child labour force beyond 14 years-old children. There is no specific measure concerning the worst form of child labour but we assume that child labour measurement is also a good proxy to evaluate the extent of the worst form of child labour.

The FACB indicator is not based, due to a lack of data, specifically on the ILO resolutons 87 (Freedom of Association and Protection of the Right to Organise Convention) and 98(Right to Organise and Collective Bargaining Convention). This problem is raised by Kucera (2004). However, the freedom of association and collective bargaining is a part of the Freedom House civil rights indicators. And this indicator seems to be the best one to study temporal evolutions, which is not possible with the Kucera indidator (Kucera 2004) or the OECD indicator (OECD 1996).

The discrimination indicator should be based on the ILO conventions 100 (Equal Remuneration Convention) and 111 (Discrimination (Employment and Occupation) Convention). In fact, due to the lack of data concerning income by gender, our index is only based on the convention 111. We assume to limit our analysis on gender inequality.

The indicator concerning the ratification behaviour takes into account the will to focus on core labour standards, giving a higher weight for the ratification of core conventions.

Our aggregate indicator include measurement of child labour, freedom of association and discrimination which are three out of the four core labour standards. Theoretically, we should include a measure of forced labour but it is impossible in a temporal perspective.

4.2 Sufficient grades of variation

In order to capture at the same time differences among countries *and* differences among time, we decide to not build aggregated groups for the different period. We keep the measures, constructed in the same way for the different periods. We have continuous variables for each of our indicators, except for the FACB indicator, based on the FHCR indicator. For this one, we have 7 scores. However, we observe significant variations among time and among countries.

The aggregate indicator, built thanks to the PCA, gives a continuous variable. Thus, we can consider we have sufficient grades of variation.

4.3 Reproducibility

As the Kucera (2004) indicator, our indicator is constructed not as end in itself but rather for use in econometric models. The credibility of the economic results that will be obtain depend on the reproducibility of the indicators. For all our indicators, we give the source of information used. All the data sources used are public and freely accessible. They come from international organizations and can be considered as the most reliable data for international comparisons.

Our index is based mainly on quantitative measures and not on a qualitative approach. It facilitates the reproducibility of the indicator.

4.4 Transparency

Because of the sources of data used to build our indicator, the method seems sound in term of transparency.

4.5 Evaluator bias

Bollen and Paxton (2000) provide evidence that evaluator bias is a significant source of systematic measurement errors for a number of indicators of democracy, including the Freedom House indicator. The main evaluator bias is what Bollen and Paxton call "situational closeness", the extent to which the countries being score are more or less alike the evaluators' own countries. To avoid this evaluator bias, we use the internationnaly recognized definition of Core Labour Standards. There is now an international consensus on this definition which cannot be seen as a definition coming from industrialized countries. We have however this problem on our FACB index because we use the Freedom House Civil Rights indicator. It will be more than useful to find in a new version of this indicator a new measure of freedom of association and collective bargaining.

4.6 Information Bias and other problems with information sources

NRC (2004) considers there are two main problems concerning data sources on labour standards. The first one is that most of the data sources reflect conditions only in the formal sector and ignore what are ofter far worse conditions in rural areas and the informal sector of developing countries. It is clearly a limit of the quantitative indicators on labour standards. However, as stated by Kucera (2004), this indicator will be used to evaluate the effects on primarily formal sector phenomena. A specific analysis of the linkages between labour standards and informal sector is necessary but it is another research issue (see Galli and Kucera (2004) for an empirical study in the informal sector). The second problem is that many sources also do not provide comparable information across time or across countries. It is not a problem regarding the way we had to build our indicator and the data sources used.

Then, the Department of Labor used different criteria to include quantitative data in the WebMILS (Monitoring International Labour Standards[23]):

- The data were collected in a reliable census or survey.
- Survey recipients in the survey sample are drawn from an actual census.
- The data are national in coverage.
- Data are consistent over time, in order to allow assessments of trends. Any necessary changes in data definitions or collection methods should be fully documented.

We try to use only international data that respect these criteria. For example, concerning the discrimination indicator, we prefer to not take into consideration data on wages because of the lack of consistency

[23] available at http://www.dol.gov/ilab/webmils/

over time and problems of comparison among countries. Also, concerning the school enrollment rates or the literacy rates, we provide data between 1970 and 1995 in order to keep only data built on the criteria of CITE 76[24].

5 Conclusion

The indicator of the global level of core labour standards is a first attempt to build a temporal measurement of the effective level of labour standards in a large sample of countries. With indicators on the level of child labour, discrimination, freedom of association and collective bargaining, and number of ratifications, we can have an idea both of the level and of the evolutions of core labour standards between 1970 and 1995 (with a five-years gap between the different measures). We tried to minimize the bias of measurement, the problems of information or reliability of the data by aggregating different sources of information coming from international organizations. Also we assume to measure only the common trend between the different labour standards, which can be seen as a global level of labour standards. That is why we aggregate the different indicators obtained thanks to the Principal Component Analysis Method.

The measurement obtained cannot be perfect. The main goal is to allow international comparison and have an idea of the evolutions of these standards. Also, we have to keep in mind this indicator is done to be used for econometrical studies. For each of the data sources used, we use always the same source of information for all countries and all period.

This attempt is the first one and can be, for sure, improved in the future. The first priority is to give a more reliable measure of Freedom of Association and Collective Bargaining. For the next periods, it could be possible to extend the Kucera (2004) indicator, based on a qualitative approach. For earlier periods, it seems very difficult. Also, it is necessary to give a quantitative or a qualitative assessment of forced labour for different periods. The work of Busse and Braun (2003) is an interesting starting point.

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Core Labour Standards and ILO Conventions

Adopted in 1998, the ILO Declaration on Fundamental Principles and Rights at Work is an expression of commitment by governments, employers' and workers' organizations to uphold basic human values - values that are vital to our social and economic lives.

- Freedom of association and the right to collective bargaining
  - The Freedom of Association and Protection of the Right to Organise Convention (No.87), 1948, 142 ratifications[25]
  - Rhe Right to Organize and Collective Bargaining Convention (No.98), 1949, 154 ratifications
- The elimination of forced and compulsory labour
  - The Forced Labour Convention (No.29), 1930, 163 ratifications
  - The abolition of Forced Labour Convention (No.105), 1957, 161 ratifications
- The abolition of child labour
  - Minimum Age Convention (No.138), 1973, 131 ratifications
  - The Abolition of the Worst Forms of Child Labour Convention (No.182), 1998, 147 ratifications
- The elimination of discrimination in the workplace.
  - The Equal Remuneration Convention (No.100), 1951, 159 ratifications
  - The Discrimination (Employment and Occupation) Convention (No.111), 1958, 161 ratifications

The ILO's standards take the form of international labour Conventions and Recommendations. The ILO's Conventions are international treaties, subject to ratification by ILO member States. Its Recommendations are non-binding instruments - typically dealing with the same subjects as Conventions - which set out guidelines which can orient national policy and action. Both forms are intended to have a concrete impact on working conditions and practices in every country of the world. However, coutries can decide to not ratify conventions. When ratified, these promotional standards oblige a country to use means apropriate to national circumstance to promote these goals - and to be able to demonstrate progress over time in achieving the goals. ILO cannot apply sanctions.

Moreover, United Nations have adopted several measures concerning Human Rights and more precisely Rights of Workers. Following the Universal Declaration of Human Rights, the UN have adopted two covenants : the International Covenant on Economic, Social and Cultural Rights (1966) and the International Covenant on Civil and Political Rights (1966) (prohibition of forced labour). These covenants are ratified by more countries than the ILO core conventions. The UN have also adopted a convention on the Rights of the Child (1989).

[25]Number of ratifications, 19 January 2004