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Exploratory analysis of the indicators proposed by Doing Business Reports 2005 and 2006 of the World Bank

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¹ The findings, interpretations, and conclusions expressed here are those of the author and do not necessarily reflect the views of the “Attractivité économique du Droit- Economic Attractiveness of Law” program, neither his partners.

The present paper carries out a thorough analysis of the characteristics and the explanatory power of the indicators proposed by the World Bank in its *Doing Business* reports, of which three successive editions have been released already, namely 2004, 2005 and 2006 (issued respectively in 2003, 2004 and 2005)².

Exploring the link between law and economic performance, the aim of these reports is to establish various indicators on the ease of doing business in different countries throughout the world by using the methodology of composite indicators. Although being widespread³, the methodology of composite indicators gives rise to several problems.

These problems are essentially of two types.

A first problem concerns the quality of the underlying information. The present memorandum, however, will not cope with this problem, as we do not have the skills or resources to sufficiently explore it, the problem being not solely limited to French data, but also to all data from other countries.

The second issue is the relevance of the method used to aggregate this elementary information. First, does it lead to stable rankings or to rankings which are very sensitive to the aggregation method? second, do these aggregated indicators have a significant impact on the phenomena they pretend to explain, such as standard of life or economic growth?

Such questions have already been examined. Concerning another example of composite indicators published by the *World Economic Forum*, Grégoir et Maurel (2003) showed that these indicators explained relatively poorly the relative economic performance of countries. Also, they demonstrated that the rankings obtained were unstable. In particular, a reweighing of the elementary components of these

² This analysis was carried out at the request of the scientific board of the "Economic attractiveness of law" programme (EAL). This memorandum summarises two memos devoted successively to the analysis of data from the 2005 and 2006 reports.

³ See Nardo et al. (2005) for a general discussion of the quality criteria which can be used to judge the suitability of an indicator.

indicators seeking to measure their correlation with economic performance, led to important changes in ranking. The initial idea of this memorandum was therefore to reproduce this approach for data from *Doing Business*. We needed nevertheless to adapt and simplify it in order to take into account the particular characteristics of this database.

The Doing Business approach is in fact a two stage one. Firstly, it develops a series of partial indicators relating to different aspects of business. In 2005 the concerned areas were:

- Starting a business
- Hiring and firing workers
- Registering property
- Enforcing contracts
- Getting credit
- Protecting investors
- Closing a business

This list was expanded in 2006 in order to take into account three additional areas:

- Dealing with licences
- Paying taxes
- Trading across borders

The global indicator then is constructed simply by averaging the ranks of countries for each of these areas.

In such context, a complete transposition of the Grégoir-Maurel approach would have required evaluating the explanatory power of the aggregate indicator, then comparing this indicator to the indicators obtained with different weightings given to the different sub-indicators. However, there were several problems with this strict transposition.

Firstly (unlike the 2006 report), the 2005 report paid little attention to the aggregated indicator. The introductory chapter produced only a table of the 20 top ranked countries according to this indicator (table 1.2 of page 2), and used this indicator only in some graphs and some elementary correlation calculations, such as graphs 1.5 and 1.6 of page 3, without any identification of countries. The rest of the report was devoted to separate discussions of the seven partial indicators mentioned above. This suggests that the authors of the report were aware of the multidimensional character of the problem and did not give priority to the construction of a global ranking of countries.

Vis-à-vis this 2005 report, there was therefore little sense in focusing the discussion on the qualities or limits of this aggregate indicator. The real question was rather that of the explanatory power of each sub-indicator. Thus, it was this analysis that was initially focused on, with rather unfavourable results. Multiple regressions of economic growth indicators, the rate of Foreign Direct Investment (FDI), gross fixed capital formation and the Human Development Index (HDI) in the seven sub-indicators of the 2005 report gave results which were generally weak, unstable or difficult to interpret. The poor quality of these multiple regressions precluded to use their results for a reweighing exercise similar to the one carried out by Grégoir et Maurel.

Nevertheless, we also examined the explanatory power of the aggregate indicator. The fact that it received more prominence in the 2006 edition retrospectively justified our interest for the explanatory power of this indicator. The result of this critical analysis is more ambiguous this time, for both 2005 and 2006 data. The aggregated indicator did not correlate with indicators such as the FDI or GFCF (Gross Fixed Capital Formation), but showed a significant correlation with economic growth, also emphasised by Djankov et al. (2005), and an even greater correlation with the human development index.

In summary, the conclusions of this review are mixed. The econometric test paradoxically invalidates the prudent approach of the 2005 report, which avoided summarising the problem of the attraction or effectiveness of the law in a single indicator. On the other hand, it does not invalidate the idea that the aggregated indicator has a significant link with economic performance. This paradoxical result can be explained by the high collinearity that must exist between the different elementary indicators: these indicators are not sufficiently differentiated in order to allow econometric methods to distinguish between

their respective effects.. On the other hand, they detect a global effect, but it remains either weak (in the case of GDP growth per capita) or difficult to interpret in causal terms (the link with HDI).

The rest of the present memorandum will successively present the analyses carried out by the 2005 and 2006 reports. Again, this analysis does not deal with what could be characterized as the main problem of these indicators – the quality of basic information used for their construction, issue which is dealt with in two other Economic Attractiveness of Law Working Papers (du Marais, 2006; Dorbec, 2006).

1. Analysis of results in the 2005 report

1.1 The data

Table 1 presents all information used in the Doing Business 2005 report, for the 7 sub-areas it covered. It indicates the names that will be given below to the corresponding partial indicators, the ranking of France according to these different sub-indicators and finally the ranking of France for the related global indicator.

Table 1: Areas covered by the base and corresponding variables

Area	Short name of indicator	French ranking	Base variables (variables in bold are those effectively used for the overall indicator for the area)
Starting a business	I_START	6	<ul style="list-style-type: none"> - Procedures (number) - Time (days) - Cost (% of income per capita) - Minimum capital (% of income per capita)
Hiring and firing workers	I_HIRE	82	<ul style="list-style-type: none"> - Difficulty of hiring - Rigidity of hours - Difficulty of firing - Rigidity of employment - Firing cost (weeks of salary)
Registering property	I_REGST	126	<ul style="list-style-type: none"> - Procedures (number) - Time (days) - Cost (% of property value)
Getting credit	I_CREDIT	105	<ul style="list-style-type: none"> - Cost of collateral (% of revenue per capita) - Strength of legal rights - Depth of credit information - Public registry coverage (for 1,000 adults) - Private bureau coverage (for 1,000 adults)
Protecting investors	I_PROT	6	<ul style="list-style-type: none"> - Extents of disclosure
Enforcing contracts (debt recovery)	I_ENFORC	10	<ul style="list-style-type: none"> - Procedures (number) - Time (days) - Cost (% of debt)
Closing a business	I_CLOSE	33	<ul style="list-style-type: none"> - Time (days) - Cost (% of estate) - Recovery rate
Overall summary indicator	I_GLOB	41	

* Indicator combining the three preceding variables

** Indicator combining the two following variables

The construction of partial indicators and the global indicator results from a three-stage process (see page 87 of the 2005 report):

- All basic variables are first transformed into ranking variables⁴ (ranking by ascending or descending order depending on whether the variable is favourable or unfavourable to the entrepreneur).
- For each of the seven areas covered by the report, the simple averages (weighted) of these ranking variables are calculated. It will be seen that these averages do not relate systematically to the variables of each sub-area (for reasons that are not necessarily evident). The variables effectively used are those listed in bold in table 1⁵.
- The rankings for these seven areas are in turn averaged, giving the global ranking indicator.

As mentioned in the introduction, this global indicator was little used in the 2005 report and its values were not provided in the associated base, except for the 20 top ranked countries. The rank we give for France is therefore a reconstituted rank. It can be observed that this global rank (41st out of 135) reflects very disparate performances between different areas. The ranking is good or very good in the areas of “ease of starting a business”, “protecting investors”, “efficiency of debt recovery” or conditions for the closing of failing businesses. On the contrary, rankings are in the second half, indeed the final quarter for: “ease of hiring and firing”, access to credit and especially procedures for registering property (126th out of 135).

1.2 Explanatory power of the sub-indicators

As the 2005 report was mainly devoted to comments on the different sub-areas and the related partial indicators, the most natural thing was to start our examination by testing the explanatory powers of these partial indicators vis-à-vis different economic performance indicators. We are interested in the explanatory power of these indicators with respect to four variables, respectively:

⁴ This procedure avoids giving too much importance to extreme values. On the other hand it tends to amplify differences between countries in the middle of the distribution. For a full discussion of the different methods of standardisation, look again at Nardo et al. (2005).

⁵ We tested the effect of the reintegration in the indicator of variables on the cost of collateral and the cost and time to close a business: this modification had only a limited impact.

- GDP/capita growth rate between 1999 and 2003 (Δ GDP/Capita in following tables)
- Rates of Foreign Direct Investment in % of GDP (FDI)
- Investment rates in % of GDP (GFCF)
- Human Development Index (HDI)

The choice of the first three variables seems quite natural: they were taken from the World Bank site and they refer to the 1999-2003 period. The choice of the fourth variable comes from the fact that its link with the ease of doing business was explicitly emphasised in the 2005 report. The HDI was collected from the United Nations Development Program site⁶ and refers to 2002.

We carried out multiple regressions for the four variables Δ GDP/capita, FDI, GFCF and HDI for all indicators on the area. These regressions introduced only one control variable, the initial level of GDP/capita.

The results of these regressions are given in table 2. Figures in bold correspond to variables that are significant at the 5% level. Given the way these indicators have been constructed, we can expect negative effects (a high value in the indicator corresponds to conditions unfavourable to economic activity).

Table 2: Regressions on the level of GDP/capita and the seven indicators corresponding to the seven sub-areas identified in the 2005 report

⁶ At the address http://hdr.undp.org/statistics/data/indic/indic_8_1_1.html.

Explanatory variables	Dependant variables			
	Δ GDP/capita	IDI	GFCF	HDI
GDP/capita	-0.0001134 (-3.39)	0.000856 (1.18)	-0.0001762 (-2.05)	0.0000046 (2.90)
I_START	-0.0091721 (-1.11)	0.0073565 (0.42)	0.0220929 (1.07)	-0.0001602 (-0.41)
I_HIRE	-0.0019075 (-0.27)	-0.0209984 (-1.42)	0.0034266 (0.19)	0.0002814 (0.82)
I_REGST	-0.0040155 (-0.54)	0.0175897 (1.07)	-0.0224789 (-1.19)	-0.0010956 (-3.10)
I_CREDIT	0.0053489 (0.73)	-0.0139740 (-0.88)	-0.0064992 (-0.35)	-0.0008717 (-2.49)
I_PROT	-0.0019793 (-0.22)	0.0091485 (0.48)	0.0038692 (0.17)	-0.0006719 (-1.57)
I_ENFORC	-0.0228308 (-2.59)	-0.0154908 (-0.84)	-0.0684518 (-3.11)	-0.0002509 (-0.59)
I_CLOSE	-0.0090554 (-0.97)	0.0017585 (0.09)	0.0019101 (0.08)	-0.0010145 (-2.29)
Constant	5.742885 (6.14)	4.771194 (2.38)	27.4595 (11.59)	0.9156035 (20.63)
R ²	0.1800	0.0829	0.1139	0.6178

Note: T-statistics in parentheses. Significant coefficients at the 5% level in bold.

Negative effects dominated (eighteen compared to ten), but the number of significant effects seemed very limited: five effects out of twenty eight in this case. It is for the explanation of HDI that significant effects are the most numerous: partial indicators which are significantly correlated to the HDI are the indicators of registering property (I_REGST), getting credit (I_CREDIT) and the ease of closing a business (I_CLOSE).

The only other significant results concern the impact of the ease of enforcing contracts (I_ENFORC) which significantly affects the growth of GDP/capita and GFCF: it is difficult to find an intuitive justification of the predominant role of this component of the legal system.

Among the coefficients which displayed positive signs, we noted the effect of employment rigidity on HDI – an interesting result. The idea that the flexibility of employment is a factor that contributed positively to the HDI could be discussed *a priori*: the result we obtain confirms that the relation is not obvious and could have the opposite sign. The obtained coefficient, however, remains insignificant. The other changes in sign, still insignificant, have little supporting evidence: they relate to: I_CREDIT (in the explanation of GDP), I_START and I_PROT (in the explanation of FDI and GFCF).

Finally, this first analysis had difficulties in confirming the expected effects of these different sub-indicators. The coefficients of these multiple regressions are imprecise and unstable. This restricted the transposability of the Grégoir-Maurel approach. The calculation of a global indicator reweighed with these coefficients was formally possible, but made little sense and will not be considered in the present memorandum.

Such negative conclusion, however, is not sufficient to disqualify the global indicator computed as a simple average of elementary indicators. The fact that these sub-indicators are not significant does not mean necessarily that the same result holds for their average. The explanatory power of this averaged indicator must be tested directly.

1.3 Explanatory power of the global indicator

Tables 3a and 3b therefore examine the relationship between the same dependent variables and the global equiweighted indicator I_GLOB, considering firstly the same control by the level of GDP/capita as in preceding regressions, then with two additional controls: by the global GDP (and indicator of the global size of economies), and by an indicator of the geo-economic isolation of the country. This “gravity” indicator measures the average distance of the country from all other countries in the world, weighted by the economic importance of these countries⁷. The global GDP level and the gravity variable were primarily introduced to improve the explanation of FDI rates (negative effects are expected for FDI both for the size and gravity variables)⁸.

As this global indicator is a variable which increases alongside the difficulty in doing business, one may here also expect a *negative* effect on each of the four variables of interest.

The findings are this time more favourable. The best result relates to the explanation of HDI. The negative and significant sign attests to a positive relationship between HDI and the ease of doing business, which was already apparent from figure 1.6 in the 2005 report.

Table 3: Regressions of the growth of GDP/capita, IDI rates, GFCF and the human development indicator on the level of GDP/capita and the global indicator of ease of doing business.

⁷ I want to thank P. Sillard for having provided this variable

⁸ We also tested additional controls by the type of legal system in the sense of the 2004 report (Anglo-Saxon, French, Sovietic, Germanic and Nordic systems) without finding very clear systematic effects of these variables, whether used alone or together with the global indicator of the 2005 report

3.a. Control limited to GDP/capita

Explanatory variables	Dependent variables			
	Δ GDP/capita	IDI	GFCF	HDI
GDP/capita	-0.000962 (-3.21)	0.0000998 (1.58)	-0.0001327 (-1.73)	0.0000069 (4.77)
I_GLOB	-0.0315936 (-4.24)	-0.009475 (-0.60)	-0.04367 (-2.29)	-0.002371 (-6.61)
Constant	4.82913 (7.05)	4.113988 (2.85)	25.59038 (14.67)	0.8121173 (24.60)
R ²	0.1229	0.0555	0.0398	0.5897

3.b: Control by GDP/capita, global GDP and a gravity variable

Explanatory variables	Dependent variable			
	Δ GDP/capita	IDI	GFCF	HDI
GDP/capita	-0.001408 (-4.22)	0.0001195 (1.66)	-0.0001587 (-1.81)	0.00000635 (3.72)
Total GDP	0.002883 (1.16)	-0.0009347 (-1.75)	0.0002649 (0.40)	-0.00000634 (-0.50)
Gravity variable	-3.116338 (-4.31)	-1.577018 (-1.01)	-1.73 (-0.91)	-0.0483538 (-1.31)
I_GLOB	-0.0306435 (-4.14)	-0.0092288 (-0.58)	-0.0396156 (-2.03)	-0.0024329 (-6.42)
Constant	32.44624 (5.05)	18.03386 (1.30)	40.594 (2.39)	1.249999 (3.80)
R ²	0.2397	0.0864	0.0424	0.5943

Note: Student statistics in brackets.

Figure 1. Δ GDP/capita as a function of I_GLOB

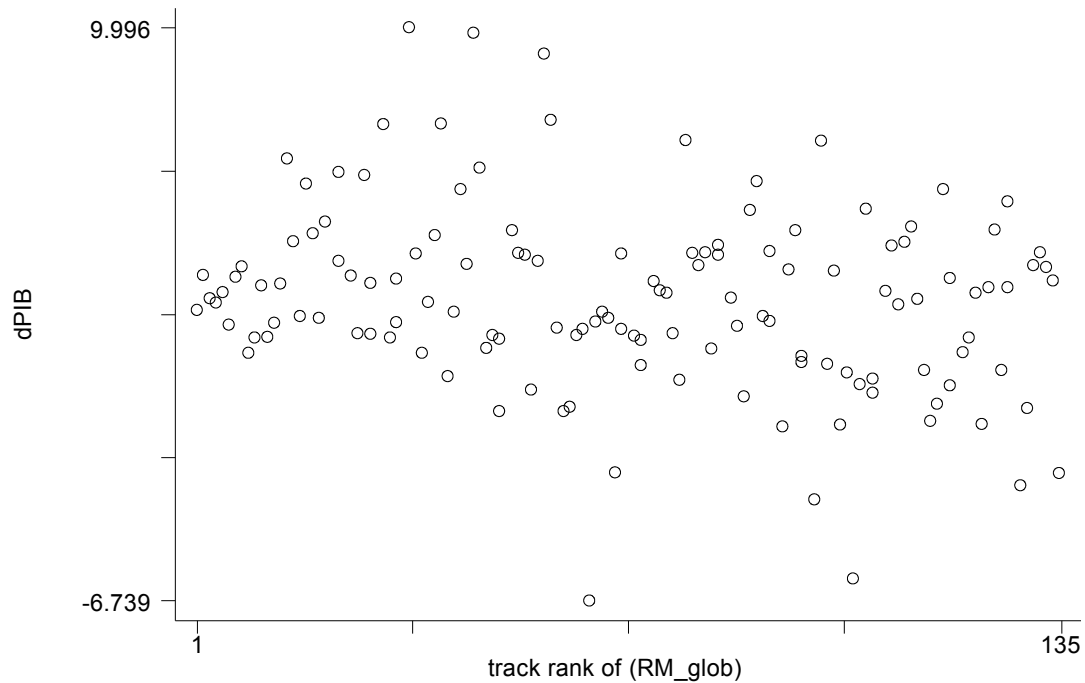


Figure 2. *FDI as a function of I_GLOB*

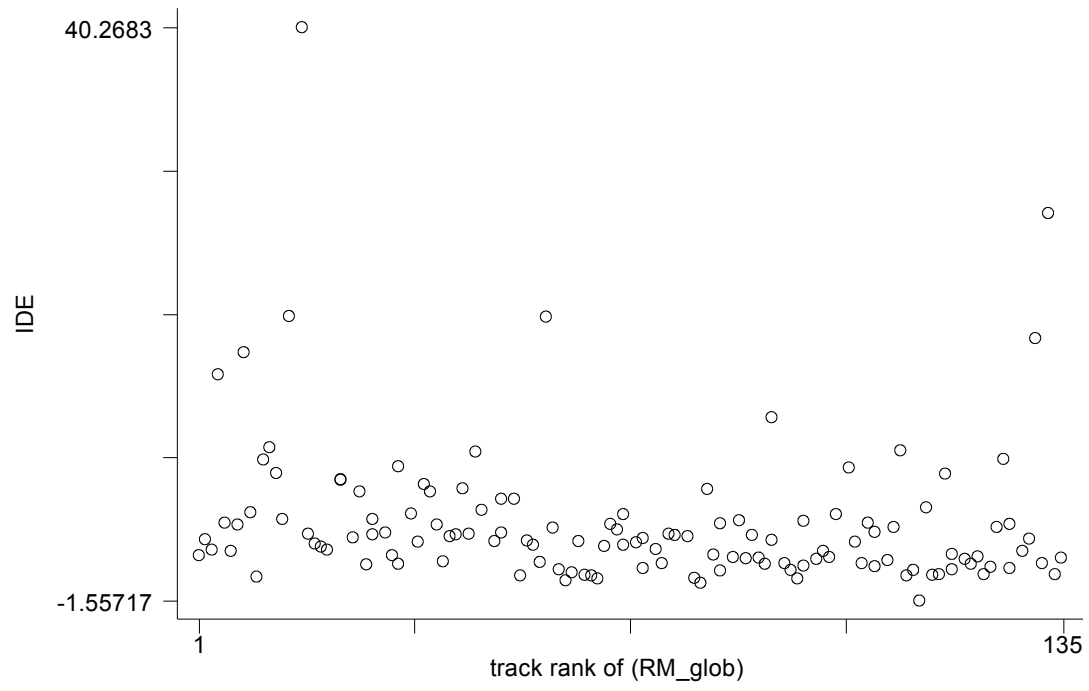


Figure 3. GFCF as a function of I_GLOB

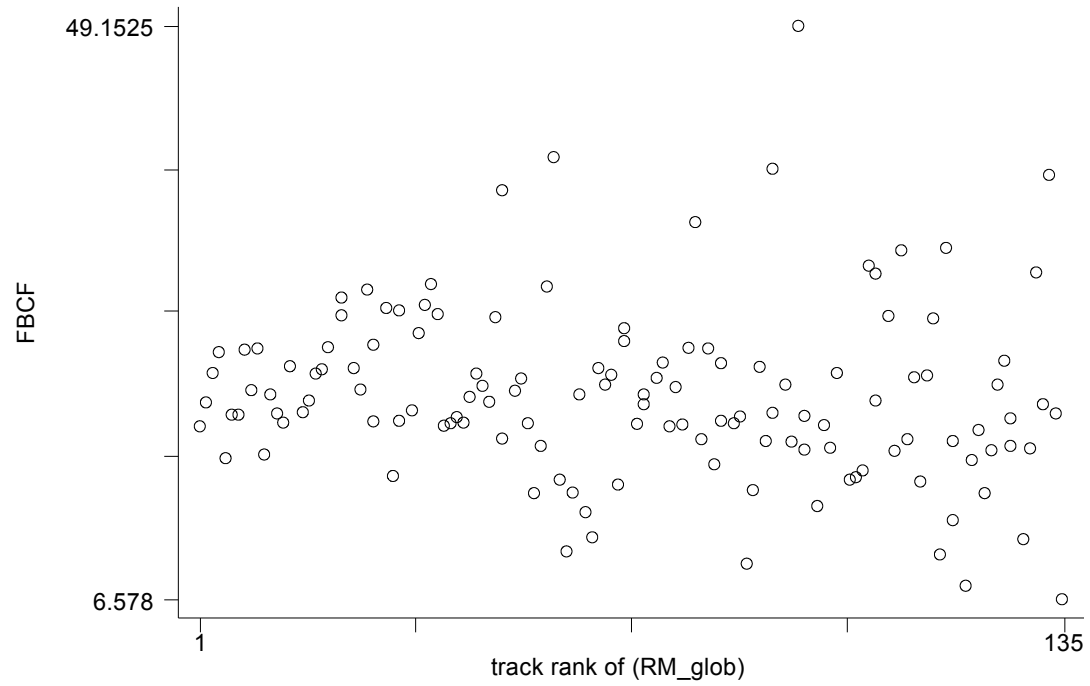
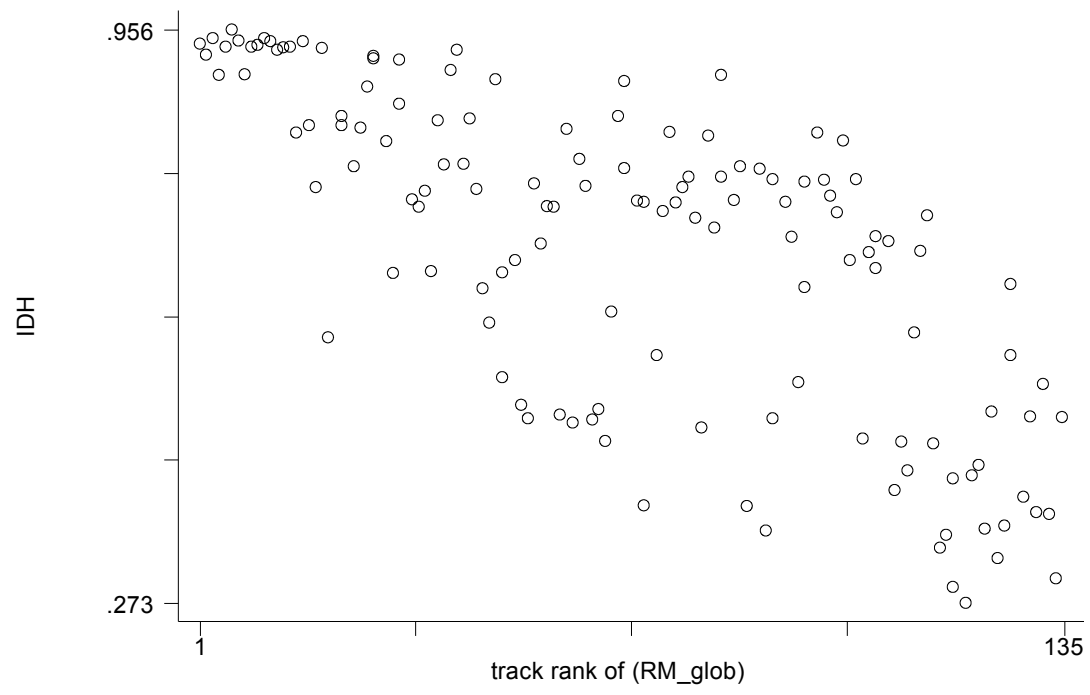


Figure 4. HDI as a function of I_GLOB



An objection to the causal interpretation of this positive relationship may be that it merely reflects the simultaneous dependence of the HDI and the ease of doing business indicator on the overall level of development. The fact that the effect of ease of doing business resists control by GDP/capita and the two other variables tempers somewhat this reserve, but does not reject it totally. It would be necessary to test whether the effect of the I_GLOB indicator resists a stronger control using other explanatory factors for the HDI. It would be also necessary to examine whether part of this correlation is not due to the fact that certain components of the HDI include or are close correlates of some components of the ease of doing business indicator.

One can also observe a significant effect of the global indicator upon the growth of GDP/capita. On the other hand, it is non-significant, or at the limits of significance for the two other variables. These results are robust when controlled by the level of total GDP or the gravity index⁹.

A visual confirmation of these links or absence of links can be found in the simple correlation graphs provided in figures 1 to 4.

2. Analysis of the results of the 2006 report

This section carries out exactly the same analyses as the previous section, based on data from the 2006 report, by integrating the three new sub-indicators introduced in this last report relating to dealing with licences, paying taxes and trading across borders.

It will be noted that the values of dependent variables have not been updated. They continue to be used as *proxies* for structural performances of the different countries analysed, which we are seeking to link to the structural legal characteristics measured by the ease of doing business indicator¹⁰.

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¹⁰ As a matter of fact, there are variations in the composition of the indicator from one year to the next, some of which are due to changes in business law. In this case it would be interesting to test the effects of these changes on economic performance, but this would also involve a certain amount of regression. Even with regression, it is probable that these effects would remain very artificial. We are bound here by the structural approach.

The results are given in tables 4 and 5 attached, directly comparable to tables 2 and 3, with one difference: to follow Djankov et al. (2005), the indicators or sub-indicators used in the regressions are no longer the gross rankings of countries (which vary from 1 to the maximum number of countries), but relative performance indicators varying between 0 and 1 and are calculated according to:

$$\text{indicator} = 1 - \text{rank} / \text{number of countries}$$

This will lead to coefficients where the signs will generally be the opposite of those of indexes used in the previous section, with an absolute order of magnitude 130 to 140 times greater. This difference can be easily explained: regression coefficients for the preceding part measured the variation of the variable explained when losing one place in the ranking considered. The new coefficients indicate how much the dependant variable would change in the very hypothetical case of a country moving from the *last* to *first* position in the same ranking. It is therefore normal that to get figures of the opposite sign and with a scale of around 100 times greater. But this change is completely neutral for measures of statistical significance (R^2 or Student coefficients).

Concerning the explanatory power of the different sub-indicators (table 4), we still encounter the insignificant results obtained in the previous section. None of the sub-indicators significantly explains FDI flows. The sole sub-indicator which seems to correlate with the growth of GDP/capita or the GFCF is the ease of enforcing contracts: the same result was obtained on 2005 data. There are several sub-indicators which have significant results with respect to HDI: there are two sub-indicators which were already significant in the previous assessments (registering property and getting credit) completed by the ease of trading across borders.

Table 4: Regressions of the same variables on the level of GDP/capita and partial indicators relating to the 10 sub-areas identified in the 2006 report

Explanatory variables	Dependent variable			
	Δ GDP/capita	FDI	GFCF	HDI
3				
GDP/capita	-0.0001055 (-3.05)	0.0000892 (1.13)	-0.0002209 (-2.48)	3.19e-06 (2.11)
I_starting_business	1.960181 (1.82)	0.1635048 (0.06)	-0.4021068 (-0.15)	0.0652238 (1.36)
I_dealing_licenses	-1.592991 (-1.56)	-0.0275237 (-0.01)	1.647658 (0.63)	-0.033868 (-0.75)
I_hiring_and_firing	-1.547072 (-1.75)	0.1101081 (0.06)	-1.886207 (-0.84)	-0.0593459 (-1.54)
I_registering_property	0.850219 (0.91)	-3.681588 (-1.69)	1.162273 (0.48)	0.103512 (2.53)
I_getting_credit	0.393172 (0.38)	1.619532 (0.69)	1.157406 (0.44)	0.1599067 (3.52)
I_protecting_investors	-0.4701005 (-0.50)	1.05431 (0.50)	-2.977578 (-1.24)	-0.0810474 (-1.97)
I_paying_taxes	1.643448 (1.76)	0.9299863 (0.43)	4.049381 (1.68)	0.0434599 (1.06)
I_trading_	-0.6754737 (-0.57)	-0.073609 (-0.03)	0.367049 (0.12)	0.2231043 (4.28)
I_enforcing_contracts	2.623549 (2.44)	0.9826234 (0.40)	5.883868 (2.12)	-0.0175742 (-0.37)
I_closing_business	2.071117 (1.69)	0.8636645 (0.31)	1.875166 (0.59)	0.0953586 (1.77)
R ²	0.2369	0.0901	0.1366	0.7054

Note: T-statistics between parentheses. Significant coefficients at 5% in bold.

Table 5: Regressions of the growth of GDP/capita, FDI rates, GFCF and the human development indicator on the level of GDP/capita and the global indicator of ease of doing business.

5.a. Control limited to GDP/capita

Explanatory variables	Dependent variables			
	Δ GDP/capita	IDI	GFCF	HDI

GDP/capita	-0.000077 (-2.40)	0.0001096 (1.69)	-0.0001324 (-1.69)	0.0000061 (4.15)
Overall WB indicator	3.155 (2.92)	0.766 (0.35)	5.744 (2.18)	0.344 (6.92)
R ²	0.0632	0.0537	0.0362	0.5996

5.b. Control by GDP/capita, global GDP and a gravity variable

Explanatory variables	Dependent variables			
	Δ GDP/capita	IDI	GFCF	HDI
GDP/capita	-0.000134 (-3.76)	0.0001251 (1.66)	-0.0001749 (-1.91)	5.25e-06 (2.99)
Total GDP	0.000327 (1.28)	-0.0009268 (-1.73)	0.0003378 (0.52)	-1.77e-06 (-0.14)
Gravity variable	-3.382426 (-4.56)	-1.650963 (-1.06)	-2.128508 (-1.12)	-0.0730448 (-2.00)
Overall WB indicator	3.477464 (3.30)	0.8821118 (0.39)	5.651065 (2.08)	0.3516584 (6.77)
R ²	0.2033	0.0850	0.0442	0.6058

Note: T-statistics between parentheses.

Table 5 shows that the new global indicator keeps its significant explanatory power for differentials in rates of economic growth, even if this explanatory power is limited. The correlation is again stronger with the human development indicator, without, however, any possibility to say whether this correlation is the result of a co-determination by other development factors. These results, obtained with a control by the initial GDP/capita are again robust to the introduction of additional controls by the total GDP (size of economies) or the “gravity” index measuring the relative geographical and economic isolation of each country (average distance from other countries weighted by their economic weight).

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