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Institutional Quality and the Gains From Trade

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HWWA DISCUSSION PAPER

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Institutional Quality and the Gains From Trade

ABSTRACT

While theoretical models suggest that trade is likely to increase productivity and income levels, the empirical evidence is rather mixed. For some countries, trade has a strong impact on growth, whereas for other countries there is no or even a negative linkage. We examine one likely prerequisite for a welfare increasing impact of trade, that is, the role of institutional quality. Using several model specifications, including an instrumental variable approach, we identify those aspects of institutional quality that matter most for the positive linkage between trade and growth. We find that, above all, labour market regulation is the key to reducing trade-related adjustment costs. Market entry regulations, the efficiency of the tax system, the rule of law and government effectiveness do play a role too. In essence, the results demonstrate that countries with low-quality institutions are less likely to benefit from trade.

JEL Classification: F16, L51, O17, P48

Keywords: Trade, Income Levels, Institutional Quality, Regulations, Good Governance

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1. Introduction

There is extensive theoretical and empirical literature on the potential gains from trade. Given constant returns to scale, perfect competition and the absence of distortions, traditional trade theory shows that there are considerable welfare gains from market integration through trade. If anything, the majority of empirical studies confirm that outcome, showing that trade is positively associated with growth rates.¹ However, this linkage is not always robust and may depend on the country sample, period and methodology used. Likewise, some studies have shown that trade may have an uneven impact on growth rates: At given levels of openness, some countries are more likely to benefit from trade than other countries. For example, while a number of Southeast Asian countries have seen spectacular growth rates, partly due to an aggressive export-oriented development strategy, several African or Latin American nations were less able to harness the benefits of trade.

Following this, the question arises as to what the prerequisites for a positive linkage between trade and growth and thus, a successful trade liberalisation, would be. Needless to say, this issue is of enormous importance for policy makers who intend to harness the benefits of the globalisation of their country. Fortunately, some evidence already exists for a number of policy areas. Countries that have better macroeconomic management (stability), well-functioning infrastructure, and competitive markets may trade more than countries where these conditions are not met (WTO, 2004). More importantly, if these prerequisites are ensured, trade may also have a more beneficial impact on growth rates. Though both theoretical reasoning and empirical evidence are persuasive, we do not believe that these prerequisites alone are sufficient, but rather, we believe that there are further determinants of a successful dismantling of trade barriers. In the following, we will point out that having institutions of high quality may directly or indirectly have an impact on the linkage between trade and growth.

Institutions can be defined as humanly devised constraints that structure political, economic and social interactions (North, 1990). They exist to reduce uncertainties that arise from incomplete information concerning the behaviour of other individuals in the process of

¹ See Yanikkaya (2003) for a review of the extensive literature. Prominent empirical studies are, for example, Dollar (1992), Levine and Renelt (1992), Sachs and Warner (1995), Frankel and Romer (1999), Dollar and Kraay (2002), Irwin and Terviö (2002), and Noguer and Siscart (2005). A critical view can be found in Rodriguez and Rodrik (2000).

interaction. In the field of economic interaction, institutions are to decrease information asymmetries by channelling information about market conditions, goods and participants. This facilitates comprehensible and mutual co-operation between market actors. Property rights, contracts and the rule of the law are most prominent institutions (Rodrik et al., 2004). If economic actors can trust property rights or the rule of law, transaction costs are reduced. This promotes the establishment of new business, facilitates the emergence and the functioning of markets and contributes to higher efficiency. High-quality institutions allow for operating on a larger scale and for using more efficient technologies. This increases productivity, improves competitiveness, facilitates structural change and contributes to a better division of labour in the national and international context. Above all, the quality of institutions results from the efficiency of the rules of economic interaction and the effectiveness of their enforcement. Governance and the rules for governance are of particular importance for the selection and design of efficient rules, for their diffusion and, finally, for their enforcement including surveillance, dispute settlement and sanctioning of violations.

As to the linkages among institutions, trade and growth, our main argument is relatively straight forward: While trade improves welfare increasing specialisation and fosters productivity growth within industries, in turn forcing uncompetitive firms to exit and allowing successful firms to expand, trade cannot induce specialisation or discipline firms if factor movement is restricted. In many economies, low institutional quality in the form of strict regulations prevent, for instance, labour from moving across sectors or across firms. In these countries, trade may be less able to serve as a force of growth. If the structure of economic activity is rigid, trade has only a modest impact on the allocation of resources across and within industries. What is more, to the extent that production structures change, low institutional quality may encourage increased production of the wrong goods – goods the country has no comparative advantage in.

The literature on the importance of institutional quality for the interaction of trade and economic growth is very limited. So far, only Bolaky and Freund (2004) addressed that question directly in a cross-country approach. They compiled an aggregated regulation indicator and then used it to examine the linkages between trade and income levels as well as trade and growth rates. They incorporated a sample of 108 countries and find in their empirical analysis that countries with excessive regulations do not benefit from trade.

The impact of institutional quality on the reallocation of resources within a particular economy, on the other hand, has been analysed to some extent. Most (case) studies offer only modest evidence of significant labour reallocation as openness increases in developing countries (Currie and Harrison, 1997). It has been stressed that trade reform in Mexico did not affect employment due to excessive labour regulations (Revenga, 1997). A comparison of the Portuguese and the US labour markets, on the other hand, demonstrates that employment protection has strong negative effects on the reallocation of labour (Blanchard and Portugal, 2001). This result would imply that increased openness to trade will have a lower effect on growth in economies with inflexible labour laws.

In countries with excessive regulations, industries respond to shocks, such as a lowering of trade barriers, through the expansion of existing firms, while in countries with low entry barriers, industries respond through the creation of new firms (Fisman and Sarria-Allende, 2004). In addition, in countries with high entry barriers, industries characterised by large sales turnover tend to have only a few large firms while countries with low entry barriers have many smaller firms. Thus, regulation distorts the structure of an industry, promotes industry concentration, and affects the number of entrants to an industry in case of external shocks. Similarly, there is evidence that entry regulations lead to less entry (in Western and Eastern Europe), especially in industries with naturally high entry barriers (Klapper et al., 2004). Likewise, there is less entry into labour-intensive industries in countries with excessive labour regulations.

Against this rather limited evidence, this paper will extend the literature by focussing on institutional quality (rather than just regulations) and by adding a highly disaggregated (cross-country) analysis to identify the most important (sub-)components of institutional quality that matter most for a positive impact of trade on (long-term) growth rates. In this case, institutional quality will be proxied by good governance and government regulations. The paper is structured as follows: The next section introduces the indicators used for measuring institutional quality. Following this, Section 3 embraces the model specifications. Two different estimation techniques, that is, ordinary least squares (OLS) and instrumental variable (IV) regressions, will be used. While the first technique provides a first impression of the order of magnitude of the estimated coefficients and the significance levels, only the IV approach can account for the endogeneity of the variables, since both trade and institutional quality are likely to be endogenous. Section 4 presents the empirical results, with a special

focus on the disaggregated indicators for institutional quality that are more important. Finally, Section 5 concludes and provides some policy implications for institutional reform.

2. Measuring Institutional Quality

Although the overall importance of institutions for economic development has been emphasised in the literature,² there is less agreement on how to measure the quality of institutions. For a long time, researchers who undertook empirical research on the effects of institutions had to rely on relatively few sources, such as the International Country Risk Guide (PRS Group, 2005) or the Global Competitiveness Report (World Economic Forum, 2005). While both organisations publish a large variety of relevant indicators, they retrieve their information from executive and resident opinion polls and thus measure the perceived level of institutional quality. For the majority of these indicators, they do not use factual information to measure differences in institutional quality across countries.

In a similar approach, Kaufmann et al. (2005) constructed six indicators measuring the quality of institutions by comparing good governance across countries. According to their classification, governance itself can be broadly defined as the set of traditions and institutions by which authority in a country is exercised. This includes (1) the process by which governments are selected, monitored and replaced, represented by two indicators, *Voice and Accountability*, and *Political Stability*. Furthermore, governance includes (2) the capacity of the government to effectively formulate and implement sound policies, which is represented by the indicators *Government Effectiveness* and *Regulatory Quality*. Finally, governance implies (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them, which is represented by the indicators *Rule of Law* and *Control of Corruption*. Hence, the indicators describe public institutional quality and address different dimensions of the overall government performance.³

Although the good governance measures are also perception-based indicators, we use them in the following empirical analysis for three reasons. First of all, the figures are available and

² See, for example, Acemoglu et al. (2001) and Rodrik et al. (2004).

³ For a detailed overview of the variables, the organisations and the different components of each indicator, see Kaufmann et al. (1999). The relevant indicators from the International Country Risk Guide and Global Competitiveness Report are included there as well.

comparable for a very large number of countries. No other source of information for institutional quality covers almost all countries (both developed and developing) in such a comprehensive manner. Second, the good governance indicators are in fact a combined set of underlying variables. Since they are based on a large number of different sources, any error or bias in the data is likely to be reduced in comparison to other sets of indicators for institutional quality. Finally, the six indicators are clearly relevant measures of institutional quality regarding the linkage between trade and income levels.

All indicators are standardised, ranging from about -2.5 to +2.5, with higher values corresponding to better governance outcomes. In our analysis, we use the most recent base year, namely, 2004. Given that they are perception-based, it is not surprising that all six indicators are closely associated with (the log of) GNI per capita. The partial correlations are in the range from 0.65 (*Voice and Accountability*) to 0.85 (*Government Effectiveness*), indicating a very close linkage with per-capita income levels. Our sample is relatively large and consists of 146 countries, for which we obtain information on all variables, that is, the good governance indicators as well as the dependent and the other independent variables, which will be introduced in the next section.

In addition to the good governance indicators, we use the World Bank Doing Business dataset, which provides objective measures on government regulations (World Bank, 2005b). The Doing Business indicators are comparable across economies and indicate the regulatory costs of business. They allow us to obtain information on regulatory outcomes, such as time and money spent on bureaucratic procedures, and thus to investigate the efficiency of governmental institutions in place. By focusing on evidence for regulations, we obtain more objective indicators that are less influenced by stages of economic development or recent events. Objective measures have the advantage of allowing a more precise and consistent benchmarking. The ten sub-indicators are as follows:⁴

- *Starting a Business* gives information on the average number of procedures required to start a business, the number of days and the costs required to complete the process and the minimum capital needed to start up a business
- *Labour Market Regulation* combines three different dimensions: flexibility and costs of hiring, flexibility and costs of firing, and conditions of employment

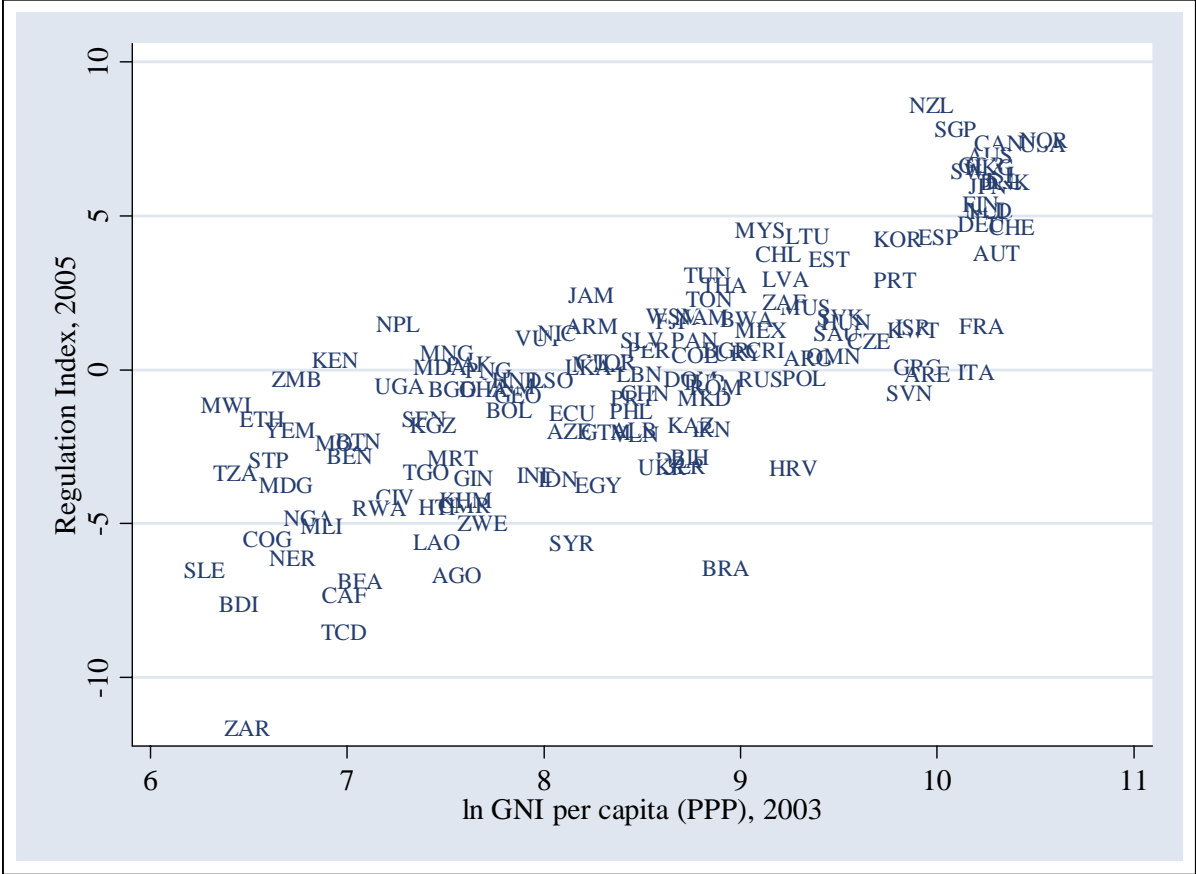
- *Paying Taxes* measures the effective tax, as a percentage of gross profit, that a medium-sized company has to pay in the second year of operation (except for labour taxes) and the efficiency of the tax administration, such as number of payments and time spent to comply with tax requirements
- *Protecting Investors* assesses the strength of minority shareholder protections against directors' misuse of corporate assets for personal gain
- *Trading across Borders* considers the efficiency of the customs and trade transport in a country, measuring the number of documents and signatures and days required to fulfil customs procedures for imports and exports
- *Getting Credit* quantifies the legal rights of lenders and borrowers, which facilitate lending through bankruptcy and collateral laws
- *Enforcing Contracts* covers the number of judicial procedures, the duration and the costs to enforce a contract and thus, measures the efficiency of the judicial or administrative system to collect overdue debts
- *Closing a Business* reflects the difficulties in closing down a business, taking into account the time and costs involved in insolvency proceedings as well as the recovery rate
- *Dealing with Licences* includes all procedures that are required for a business in the construction industry to build a standardised warehouse, as well as the time and costs to complete the procedures
- *Registering Property* considers all different procedures, including the time and costs involved, necessary to transfer a property title from the seller to the buyer when a business purchases land and a building

To facilitate a quantitative analysis, we first compute standardised figures for each (sub-)component of the ten indicators. However, a higher figure for any component may be associated with either more or less rigid regulations. In order to have a consistent set of indicators and to facilitate the interpretation of the results, we will multiply by (-1) if a higher figure is associated with more rigid regulations. As a consequence, a higher figure will always be associated with less restrictive regulations. Finally, we compute the means of all components and standardise them again to obtain consistent indicators.

⁴ See World Bank (2003, 2004, 2005c) for details.

While the Doing Business indicators are available for a total of 155 countries, we have to restrict the regressions that include these indicators to a sample of 142 countries, since information for other variables is not available.⁵ To obtain an overall index of regulations for each country (the variable is labelled *Regulation Index*), we compute a weighted average of nine out of ten regulation indicators. We do not include *Protecting Investors*, as information for a further eight countries for this indicator is missing. The aggregated indicator is compiled taking factor loadings in principal components analysis as weights.⁶ Similar to the good governance indicators, the overall regulatory quality is closely associated with GNI per capita, measured at purchasing power parity (PPP), as can be seen in Figure 1. The partial correlation between the two variables is equal to 0.78.

Figure 1: Per-Capita Income and Regulation Index



4. Model Specifications

In all our model specifications, the dependent variable is the log-level of GNI per capita, measured in PPP US dollars (the variable is labelled *GNI*). Given the assumption that per-capita income levels were roughly similar in the very distant past, differences in current income levels reflect a diverging growth performance in the long run. By using per-capita income levels, we can interpret the estimates of the regressions as capturing the effects of the independent variables on growth in the very long run. We would have preferred a panel data analysis, but the regulatory variables are available only since 2003, which is not sufficient for a time-series analysis. The good governance indicators, in contrast, exist since 1996, but they are standardised indicators, obstructing a meaningful a time-series analysis as well.

As the independent variables, we include measures for geography and market size, in addition to indicators for institutions and trade. More specifically, we include the following explanatory variables:⁷

- Distance from equator, measured as absolute value of latitude of the country's capital city (*Distance*)
- Dummy for landlocked countries (*Landlock*)
- Market size, measured as total population in million people (*Population*)
- Trade, computed as the sum of imports and exports, divided by GDP (*Trade*)
- Institutional quality as specified in the previous section, that is, good governance and regulatory quality (*Institution*)
- Ethno-linguistic fractionalisation of the population, measured as the average of ethno and linguistic diversity (*Fractionalisation*) and
- Conflicts, computed as the number of internal and external conflicts that took place in a country from 1970 to 2004, multiplied by the intensity of each conflict (*Conflict*)

The first two variables are related to the geography of a country. Geography may have an impact on incomes through agricultural productivity and morbidity rates (Diamond, 1999). The distance from the equator can be interpreted as a proxy for various determinants of economic growth that relate to the climate. For example, a country with a tropical climate is

⁷ Data sources for all variables can be found in Appendix B.

more likely to suffer from higher morbidity rates and thus lower growth rates due to malaria or other tropical diseases (Sachs, 2001). Thus, we expect a negative link with per-capita income. Being landlocked is likely to increase transport costs and hence, reduces trade and other economic activities across borders, in particular in developing countries with poor infrastructure (also negative linkage with income). The third variable, market size, may be another important determinant of per-capita income levels, since a large internal market is likely to be associated with increasing economic efficiency due to economies of scale and intensive competition. We proxy market size with the total population since we cannot use total GDP, and expect a positive coefficient.

Differences across countries in public policies and various economic indicators, including income levels, may also be explained by the ethno-linguistic diversity of a country (Easterly and Levine, 1997; Alesina et al., 2003). Above all, a higher degree of fractionalisation may increase political and ethnic frictions within a country and lead to wasteful government spending. This is likely to be the case in developing countries, where low economic growth is associated with low schooling, political instability, insufficient public infrastructure, underdeveloped financial systems, and so on.⁸

The threat of incidence of internal and external conflicts, ranging from political violence, cross-border conflicts, civil disorder, civil (internal) war to an all-out war with other countries, clearly creates higher uncertainty. Domestic and international investors are then likely to increase the risk premium of their investment projects, which in turn reduces overall investment and negatively affects the country's growth rate. Other than investment, further economic and institutional variables, such as inflation, the effectiveness of aid or corruption levels, are negatively affected as well, which diminish prospects for economic development as a consequence (Collier and Hoeffler, 2004ab).

Information on conflicts is taken from an extensive database on various forms of conflicts, operated jointly by the International Peace Research Institute (PRIO) in Oslo and the Department of Peace and Conflict Research at Uppsala University in Sweden (CSCW, 2005). Researchers from both organisations have compiled information on various armed conflicts and have assigned quantitative figures for the intensity of each conflict. If there was no

⁸ Our data is taken from Alesina and associates, who provide an extended dataset for the degree of fractionalisation.

casualty involved, they assign a 0, for number of casualties in the range from 1 to 25 they give a 1, for 26 to 1000 casualties a 2 and above 1000 casualties a 3. While these numbers are necessarily arbitrary, they provide an useful dataset for any quantitative analysis as the intensity of each conflict is taken into account. For our analysis, we only include conflicts in the period from 1970 to 2004 in order to focus on the economic impact of more recent conflicts. Finally, we take the natural logarithm to reduce the skewness in the data. Similar to *Fractionalisation*, we expect a negative linkage of *Conflict* with per-capita income levels.

Accordingly, the benchmark specification is as follows:

$$(1) \quad \ln GNI_i = \beta_0 + \beta_1 X_i + \beta_2 Institution_i + \beta_3 Trade_i + \gamma_j Regional Dummy_j + e_i$$

where $\ln GNI_i$ is the (natural) log of per-capita income in country i , X_i is the set of control variables explained above, and e_i is an error term. *Regional Dummy_j* stands for a full set of regional dummies to control for regional characteristics. In addition to *GNI*, the market size and the number and intensity of conflicts also enter the regressions in logs.

Above all, we are interested in whether the observed linkage between openness to trade and income levels differs for countries with, for instance, low-quality institutions. Hence, we test the hypothesis that low institutional quality hinders countries from taking advantage of increased openness to trade. For this exercise, we divide the country sample into groups according to their relative rankings in the institutional quality indicators. More specifically, we construct an institutional dummy (*Institution Dummy*), which has a value of one if a country belongs, for example, to the group of countries with the 20 per cent worst scores on institutional quality, and zero otherwise. We then compute an interactive term of the institutional dummy and trade to see whether institutions in the most regulated countries matter and add that to the list of independent variables.⁹ The extended model specification can then be written as follows:

$$(2) \quad \ln GNI_i = \beta_0 + \beta_1 X_i + \beta_2 Institution_i + \beta_3 Trade_i + \beta_4 Trade_i * Institution Dummy_k + \beta_5 Institution Dummy_k + \gamma_j Regional Dummy_j + e_i$$

⁹ We have used the institution dummy as opposed to the institution indicators directly in the interaction because it offers a better fit.

We use different cut-off points for the institutional dummy, that is, the bottom 20, 30, 40, and 50 per cent countries (the variables are labelled *Bottom 20* to *Bottom 50*). In a similar way, we employ the dummy for different groups of countries with the top 20, 30, 40, and 50 per cent scores on our institutional measures (*Top 20* to *Top 50*). Base year for all variables is 2003, except otherwise noted.

As briefly mentioned in the first section, the control variables that are of particular interest, that is, trade and institutional quality, are likely to be endogenous. Trade might not only boost welfare levels, but expanded trade might also be the outcome of increased productivity levels, which can be a signal for market attractiveness. Likewise, high-quality institutions influence income levels, but there might also be a reverse influence from income levels to institutions, since citizens from richer countries are likely to have stronger preferences (as well as the knowledge and the resources) for high-quality institutions. We are very likely to obtain biased results in OLS regressions and, therefore, add an instrumental variable approach. More specifically, we employ a two-stage least squares (2SLS) estimation procedure. The identification strategy is to use the Frankel and Romer (1999) instrument for trade, that is, the fitted values of trade predicted by the exogenous variables in a gravity model.¹⁰ This approach has the main advantage that geographical components of trade flows are identified and used to examine the linkage between trade and income levels.

For the quality of institutions, we follow the literature and use two different sets of variables that are partly based on history: First, the legal origin, that is, whether a country has a British, German, French, Scandinavian, or Socialist origin for its legal system, and second, the share of the population who speak English and/or a major European language. There is evidence that the colonial origin is still a major determinant of the current institutional setting and regulatory quality of a country (La Porta et al., 1998, 1999). The legal origin may have an influence on the disposition of countries when they intend to reform their institutional structure. Along these lines, the French legal origin is highly correlated with an excessive regulatory environment and may lead to lower quality institutions, particularly when the French legal system was implemented in developing countries (Djankov et al., 2002). We do not, however, use mortality rates of European settlers as an instrument for institutional

¹⁰ We are grateful to Aart Kraay for sharing his estimates for the Frankel and Romer fitted trade values. Other data, such as the distance from the equator or information on landlocked countries, are also taken from the Dollar and Kraay (2002) dataset.

quality, as suggested by Acemoglu et al. (2001), as this would severely reduce the number of countries included in our sample, which could bias the results.

4. Empirical Results

After introducing both model specifications, we next turn to the empirical results. We start with the benchmark equation (1) and OLS regressions (columns 1 to 6 of Table 1). Most of the control variables have the expected sign, but not all of them are statistically significant. An increase in the distance from the equator, having access to the sea and a lower degree of fractionalisation are closely associated with an increase in per-capita income. A larger population is associated with higher GNI figures. The conflict variable is significant (and has a negative sign) in one of the specifications only. Not surprisingly, geographical variables lose their explanatory power when regional dummies are included. The same effect applies to ethnic and linguistic diversity of the population.

If regional dummies are excluded, openness to trade is always positively associated with per-capita income (columns 1 to 4). The coefficient for *Trade* is significant at the 5 or 1 per cent level, even when we include *Rule of Law* (column 4). We only use *Rule of Law* as an indicator for good governance, but the results do not change much if one of the other five indicators is included. The significance of the coefficient for openness to trade vanishes if we include regional dummies (columns 5 and 6). This result implies that regional characteristics explain variations in income levels to a considerable degree and that the linkage between trade and income is not robust to this specification. Both the *Rule of Law* and the *Regulation Index* are highly significant and positively associated with per-capita income. They clearly dominate the OLS regressions and significantly improve the overall fit of the model (R^2 of 0.78 and above).

Table 1: Trade and Income Levels, Benchmark Regressions, 2003

Independent variables	Dependent variable: ln GNI per capita, PPP US \$, 2003											
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) IV	(8) IV	(9) IV	(10) IV	(11) IV	(12) IV
Trade	0.47** (2.02)	0.50*** (2.62)	0.45*** (2.49)	0.26*** (2.70)	0.11 (1.28)	0.13 (1.20)	-0.05 (-0.13)	0.11 (0.29)	0.16 (0.45)	-0.21 (-0.80)	-0.15 (-0.65)	0.08 (0.29)
Rule of Law				0.73*** (11.80)	0.82*** (10.82)					0.91*** (5.97)	0.85*** (5.40)	
Regulation Index						0.14*** (6.56)						0.11*** (3.20)
Distance from Equator	0.05*** (11.74)	0.04*** (8.30)	0.03*** (7.92)	0.02*** (4.97)	0.01 (1.04)	0.01 (1.60)	0.05*** (11.21)	0.04*** (8.25)	0.03*** (7.52)	0.01** (2.43)	0.00 (0.79)	0.01** (1.98)
Landlock	-0.74*** (-4.74)	-0.55*** (-3.51)	-0.58*** (-3.69)	-0.21* (-1.66)	-0.10 (-0.80)	-0.21 (-1.56)	-0.78*** (-4.44)	-0.58*** (-3.49)	-0.60*** (-3.69)	-0.15 (-1.03)	-0.10 (-0.84)	-0.25** (-1.84)
ln Population	0.05 (0.99)	0.07 (1.57)	0.12** (2.39)	0.10*** (2.65)	0.08*** (2.81)	0.06* (1.87)	0.01 (0.18)	0.05 (0.92)	0.10** (2.07)	0.08** (1.93)	0.07** (2.19)	0.06 (1.53)
Fractionalisation		-1.47*** (-4.12)	-1.37*** (-3.93)	-0.95*** (-3.54)	-0.09 (-0.35)	-0.18 (-0.60)		-1.45*** (-4.74)	-1.34*** (-4.43)	-0.81*** (-3.17)	0.00 (0.78)	-0.17 (-1.04)
ln Conflict			-0.11** (-2.22)	0.02 (0.60)	0.04 (1.22)	-0.03 (-0.71)			-0.12** (-2.31)	0.04 (0.78)	0.04 (0.83)	-0.04 (-1.04)
Regional Dummies	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Shea partial R ² (first-stage)												
Trade							0.19	0.19	0.20	0.24	0.24	0.22
Rule of Law										0.23	0.22	
Regulation Index												0.27
Sargan overidentification test							(0.00) ¹	(0.00) ¹	(0.00) ¹	5.97	3.99	1.83
($\chi^2(j)$ P-value)										(0.20)	(0.41)	(0.61)
R ²	0.53	0.60	0.61	0.78	0.84	0.80	0.50	0.58	0.60	0.75	0.84	0.80
Observations	146	146	146	146	146	139	146	146	146	146	146	139

Notes: Constant term is not shown due to space constraints; OLS regressions have been estimated with robust standard errors; t or z-values are reported in parentheses; multicollinearity has been tested by the creation of variance inflation factors (VIF), all regressions pass at conventional levels; ¹equation exactly identified; significance at the 10, 5, and 1 per cent levels are denoted by *, **, ***, respectively; instrumented variables (depending on the specification): Trade, Rule of Law, Regulation Index; instruments: Fittrade, Engfrac, Eurfrac, Legal Origin (British, French, German, and Scandinavian), and included exogenous variables.

Columns 6 to 12 in Table 1 show the results for the IV approach. Similar to the OLS regressions, we do not include institutional variables in the first three regressions but focus on trade only (columns 7 to 9). In line with the results reported by Rodrik et al. (2004), we do not obtain a significant coefficient for *Trade* once we instrument for it. Moreover, the sign of the estimate for openness to trade switches between a positive and a negative sign. The results for the other control variables are roughly similar to those obtained in the OLS regressions. Still, both institutional indicators are highly significant and thereby, important determinants of per-capita income levels (columns 10 to 12). In these specifications, the coefficients for *Trade* continue to be insignificant.

We assess the validity of the instruments using the Sargan test for overidentifying restrictions. Our IV regressions are based on the assumption that the instruments are uncorrelated with the error term in the per-capita income equation. The results for the p-value of the *J*-test for each IV specification are reported in the last third row in Table 1. For the last three specifications, we cannot reject the null hypothesis that the instruments are uncorrelated with the error term in all specifications.¹¹ This result means that our instruments are affecting income levels but only through the trade variable and the institutional indicators.

It is important to test for the instrument relevance when using IV estimation. Since we are using more instruments than endogenous variables (columns 10 to 12), we do not know if the instruments collectively capture the independent variation in the right-hand-side variables. One way to assess this issue is to take a closer look at the magnitude of the R^2 in the first stage for each endogenous variable. The Shea first stage R^2 shows that the partial R^2 for changes in average *Trade* is between 19 and 24 per cent in all six model specifications, which is reasonable. For the institutional indicators, the figures are roughly similar, as the Shea first stage R^2 is 0.22 and 0.23 for *Rule of Law* and 0.27 for the *Regulation Index*, indicating a similar and appropriate fit. Since all values for the partial R^2 are above 10 per cent, the instruments are relevant in Shea's (1997) sense, which in turn implies that the instruments have sufficient relevance for the right-hand side variables in the growth regression. As a consequence, the chosen instruments are both valid and relevant for trade and institutional quality.

¹¹ Since we are using *Fittrade* as the only instrument for *Trade* in the first three IV regressions, the J-test is not applicable.

Next, we turn to the extended model specification (2), exploring the linkages between trade and institutional quality including an interactive term (*Trade*Institution Dummy*). In a first set of regressions, we use the aggregated regulation index and focus on the 20 per cent most regulated countries (*Bottom 20*). In the opening specification (column 1 in Table 2), namely, the benchmark OLS model excluding *Fractionalisation*, *Conflict* and the regional dummies, the coefficient for the regulation index has the expected positive sign and is highly significant at the 1 per cent level. Similar to the previous model specification, trade is positively associated with per-capita income levels. The interactive term *Trade*Bottom 20* is negative and significant at the 10 per cent level. Importantly, the coefficient for *Trade*Bottom 20* is three times as large as the coefficient for *Trade*, which implies that trade has a negative net impact on income in the countries with low-quality regulations ($+0.25-0.74 = -0.49$).¹² The significance level for the interactive term declines below the conventional threshold level, however, if we add further control variables and the regional dummies (columns 2 to 4).

We then instrument for trade, regulations and the interactive term (columns 5 to 8). The regulatory quality is still an important explanatory variable for variations in per-capita income. Similar to the results presented in Table 1, *Trade* is no longer significant in the IV regressions. The interactive term has now a negative and significant coefficient in three out of four specifications, implying that countries with the worst regulatory quality are not able to benefit from an increasing market integration. The selected instruments are both valid and appropriate for all three instrumented variables, as can be seen from the results for the Shea partial R^2 and the Sargan test.

¹² We test the joint significance of trade with the interaction term, using an appropriate F test. The hypothesis that both coefficients are jointly zero cannot be rejected at the 5 per cent level. We obtain very similar results for the other model specifications.

Table 2: Trade, Institutions and Income Levels, Aggregated Regulation Index and 20 Per Cent Most Regulated Countries, 2003

Independent variables	Dependent variable: ln GNI per capita, PPP US \$, 2003							
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) IV	(6) IV	(7) IV	(8) IV
Trade	0.25** (2.48)	0.26*** (2.70)	0.25*** (2.56)	0.18* (1.79)	0.05 (0.15)	0.30 (0.97)	0.27 (0.90)	0.05 (0.17)
Regulation Index	0.18*** (9.37)	0.17*** (8.65)	0.17*** (8.35)	0.16*** (6.77)	0.09** (2.18)	0.12*** (2.93)	0.12*** (2.84)	0.11** (2.09)
Trade*Bottom 20	-0.74* (-1.64)	-0.53 (-1.18)	-0.48 (-1.09)	-0.51 (-1.16)	-2.63* (-1.70)	-2.57* (-1.67)	-2.36 (-1.49)	-2.74** (-1.93)
Bottom 20	0.58* (1.86)	0.52* (1.74)	0.49* (1.70)	0.54* (1.88)	0.99 (1.32)	1.25* (1.66)	1.12 (1.46)	1.30* (1.85)
Distance from Equator	0.03*** (7.87)	0.02*** (6.95)	0.02*** (6.48)	0.01* (1.71)	0.03*** (6.86)	0.03*** (5.94)	0.03*** (5.98)	0.01** (1.97)
Landlock	-0.42*** (-2.58)	-0.34** (-2.19)	-0.34** (-2.21)	-0.23* (-1.67)	-0.69*** (-3.67)	-0.55*** (-2.96)	-0.55*** (-2.99)	-0.45*** (-2.52)
ln Population	0.03 (1.04)	0.05 (1.39)	0.06 (1.44)	0.05 (1.46)	-0.01 (-0.18)	0.02 (0.46)	0.03 (0.66)	0.01 (0.17)
Fractionalisation		-0.68*** (-2.48)	-0.67** (-2.46)	-0.15 (-0.51)		-0.59** (-2.02)	-0.59** (-2.07)	0.04 (0.13)
ln Conflict			-0.02 (-0.52)	-0.02 (-0.46)			-0.03 (-0.53)	-0.01 (-0.24)
Regional dummies	No	No	No	Yes	No	No	No	Yes
Shea partial R ² (first-stage)								
Regulation Index					0.33	0.28	0.30	0.23
Trade					0.25	0.22	0.24	0.24
Trade*Bottom 20					0.14	0.13	0.12	0.13
Sargan overidentification test ($\chi^2(j)$ P-value)					8.67 (0.12)	2.92 (0.40)	2.71 (0.44)	2.31 (0.68)
R ²	0.73	0.75	0.75	0.80	0.66	0.71	0.71	0.75
Observations	139	139	139	139	139	139	139	139

Notes: See Table 1; significance at the 10, 5, and 1 per cent levels are denoted by *, **, ***, respectively. For the IV regressions with the interactive term, we also explore the interactions of the legal origin and the language variables with the instruments selected from our identifying assumptions as instruments.

To ascertain whether the results are influenced by the particular threshold level chosen for the institution dummy, we repeat the exercise for the top 30, 40 and 50 per cent most regulated economies (*Bottom 30*, *Bottom 40*, and *Bottom 50*). In comparison to the 20 per cent most regulated countries, the significance levels of the coefficients for the interactive term slightly improve if we set the cut-off point at the 30 per cent most regulated economies (top-left in Table 3). While the interactive term is also statistically significant in one out of four OLS regressions, it is significant in all four IV regressions. Yet if we increase the threshold level to 40 or 50 per cent most regulated countries, the number of significant coefficients declines considerably. These results indicate that there is a particular threshold level, which is highly relevant for our results. In other words, low-quality regulations do not allow the top 20 or 30 per cent most regulated economies to take advantage of trade.

Contrary to the most regulated countries, we do not obtain significant results for the countries with better regulatory quality (*Top 20* to *Top 50*). This does not imply, however, that these countries are able to achieve gains from trade. Rather, the chosen cut-off points for the dummy or the aggregation procedure for the regulation index might contribute to this outcome. Therefore, we repeat the analysis for all ten disaggregated regulations indicators. By applying them individually, we are able to identify those regulation sub-components that drive our results. Out of the ten sub-components, *Labour Market Regulation* shows the strongest results. In all OLS and IV specifications, we obtain a negative and significant coefficient for the interactive term, independent of whether we use the 20, 30, 40 or 50 per cent threshold level.¹³ Countries with less regulated labour markets, on the other hand, are able to benefit from trade, since the sign of the coefficient is positive and significant in almost all model specifications. Following this, governments should have a strong incentive to reform their regulatory framework.

We also find strong results for regulations related to starting a business and paying taxes. For *Starting a Business* and *Paying Taxes*, the IV regressions show that at the *Bottom 50* and *Bottom 40* cut-off points, respectively, countries with excessive regulations may not take advantage from an increase in market integration. Importantly, for countries with less rigid regulations for both indicators we obtain the opposite outcome, though the results for different cut-off points are less straight forward in comparison to the labour market regulation sub-component.

For the remaining sub-components, we obtain significant results for *Trading across Borders*, *Enforcing Contracts*, and *Closing a Business*, but only for the 20 per cent most regulated countries, indicating that the threshold level is much lower for these indicators. Still, they matter for the impact of regulations on growth rates via the interaction with trade, but the negative impact of trade on income is restricted to the group of countries with very rigid regulations (bottom 20 per cent). Getting credit, dealing with licences or registering property are not closely associated in the linkage between trade and income levels. In general, these results underline the fact that some individual regulations, such as starting a business, the

¹³ Detailed results for all sub-components are not shown due to space constraints. Like all other results, they are available upon request from the first author.

rigidity of employment and paying taxes, matter more for the interaction between trade, regulations and growth. Nevertheless, we think that the overall level of regulations in a country plays an important role too. Above all, individual components which affect the reallocation of factor endowments may interact with one another.

Table 3: Trade, Institutions and Income Levels, Regulation Indicators, 2003

Cut-off point for Institution Dummy (per cent)	Number of regressions where interactive term Trade*Institution Dummy is significant (4 OLS and IV regressions each) ¹											
	Regulation Index			Starting a Business			Labour Market Regulation			Paying Taxes		
	OLS	IV	Sign ²	OLS	IV	Sign ²	OLS	IV	Sign ²	OLS	IV	Sign ²
Bottom 20	1	3	-	3	4	-	4	4	-	2	3	-
Bottom 30	1	4	-	0	3	-	4	4	-	4	4	-
Bottom 40	1	1	-	0	3	-	4	4	-	0	4	-
Bottom 50	0	0		0	3	-	4	4	-	0	1	
Top 20	0	0		0	2	+	2	4	+	0	2	+
Top 30	0	0		0	3	+	4	4	+	3	0	+
Top 40	0	0		0	0		4	4	+	1	2	+
Top 50	0	0		1	3	+	4	4	+	0	1	+
	Protecting Investors ³			Trading across Borders			Getting Credit ⁴			Enforcing Contracts		
	OLS	IV	Sign ²	OLS	IV	Sign ²	OLS	IV	Sign ²	OLS	IV	Sign ²
Bottom 20	0	1	-	4	3	-	0	0		0	3	-
Bottom 30	0	0		0	0		0	0		0	0	
Bottom 40	0	0		0	0		0	0		0	0	
Bottom 50	0	0		0	0		0	0		0	0	
Top 20	0	3	+	0	0		0	0		0	0	
Top 30	0	1	+	2	0	+	0	0		0	1	+
Top 40	0	0		0	0		0	0		0	0	
Top 50	0	0		0	0		0	0		0	0	
	Closing a Business			Dealing with Licences			Registering Property					
	OLS	IV	Sign ²	OLS	IV	Sign ²	OLS	IV	Sign ²			
Bottom 20	0	4	-	0	0		0	0				
Bottom 30	0	0		1	0	+ ⁵	0	0				
Bottom 40	0	0		0	0		0	0				
Bottom 50	0	0		0	0		0	0				
Top 20	0	0		0	0		0	0				
Top 30	0	0		0	0		0	0				
Top 40	0	0		0	0		0	0				
Top 50	0	0		0	0		0	0				

Notes: *Bottom 20* refers to the 20 per cent most regulated countries, *Top 20* refers to the 20 per cent least regulated countries, and so on. ¹10 per cent significance level or better. ² Sign of the coefficient. ³Due to the distribution of the figures for the indicator, we use the 18, 24, 36, and 46 per cent least regulated countries and the 24, 33, 46, and 54 per cent most regulated countries. ⁴Here, we use the 17 and 41 per cent most regulated countries. ⁵The positive (and significant) coefficient is due to one clear outlier (Malaysia). If we exclude this country, the significance level falls far below the 10 per cent level.

In another set of regressions, we employ the good governance variables for the computation of the institutional dummy. As opposed to the regulation indicators, we do not find a similarly strong influence of institutional quality on the interaction between trade and income levels

(Table 4). While the results of OLS regressions are broadly comparable to those of the first set of regressions, we hardly witness a consistent pattern in the instrumental approach. For *Rule of Law* and *Control of Corruption* there is some evidence that both variables matter (for the 20 per cent countries with the worst scores), but we do not obtain robust estimates. For *Political Stability* and *Voice and Accountability*, on the other hand, the coefficients for the interactive term in the IV regressions are not significant at all. One reason that might help to explain this rather disappointing outcome is the fact that the good governance indicators are perception-based and that the surveys conducted for the indicators are particularly influenced by different stages of development. This could explain the considerable differences between the OLS and IV results.

Table 4: Trade, Institutions and Income Levels, Good Governance Indicators, 2003

Cut-off point for Institution Dummy (per cent)	Number of regressions where interactive term Trade*Institution Dummy is significant (4 OLS and IV regressions each) ¹								
	Rule of Law			Control of Corruption			Regulatory Quality		
	OLS	IV	Sign ²	OLS	IV	Sign ²	OLS	IV	Sign ²
Bottom 20	4	2	-	0	1	-	1	4	-
Bottom 30	2	0	-	4	0	-	0	0	-
Bottom 40	4	1	-	4	1	-	0	0	-
Bottom 50	3	0	-	4	0	-	0	0	-
Top 20	0	1	+	0	0	-	0	0	-
Top 30	0	0	-	0	0	-	0	0	-
Top 40	0	0	-	1	0	+	0	0	-
Top 50	2	0	+	4	1	+	0	0	-
	Government Effectiveness			Political Stability			Voice and Accountability		
	OLS	IV	Sign ²	OLS	IV	Sign ²	OLS	IV	Sign ²
Bottom 20	3	3	-	1	0	-	4	0	-
Bottom 30	4	0	-	0	0	-	0	0	-
Bottom 40	1	0	-	1	0	-	4	0	-
Bottom 50	0	0	-	4	0	-	0	0	-
Top 20	0	0	-	0	0	-	4	0	-
Top 30	0	1	+	0	0	-	4	0	-
Top 40	0	0	-	0	0	-	4	0	-
Top 50	0	0	-	4	0	-	0	0	-

Notes: See Table 3. ¹10 per cent significance level or better. ² Sign of the coefficient.

Nonetheless, we do find evidence that *Regulatory Quality* and *Government Effectiveness* have some explanatory power in the instrumental regressions too. Although the IV results for both good governance indicators are not very robust, we find significant results if the cut-off point is set at the 20 cent level for the most regulated countries. Using this threshold level, we observe a negative impact of trade on income levels. *Regulatory Quality* and *Government Effectiveness* are related to the capacity of the government to effectively formulate and

implement sound policies, which in fact is quite similar to business regulations, measured by the Doing Business indicators. In fact, the partial correlations between *Regulation Index* and *Regulatory Quality* and *Government Effectiveness* are 0.82 and 0.83, respectively, indicating that both sets of indicators are closely related to each other. However, the Doing Business indicators measure regulations in a more objective way, which stresses their relevance for our analysis.

5. Concluding Remarks and Policy Implications

Our results indicate that countries with low-quality institutions have not been able to take advantage of trade so far. Thus, institutional quality clearly plays a key role for successful trade liberalisation. Among the set of indicators for institutional quality, we find that, above all, the regulatory quality matters for an efficient reallocation of factor resources within an economy. Regulations related to the labour market, market entry, as well as the tax level and efficiency of the tax system are closely linked to the gains from trade. While we obtain a positive linkage between trade and income levels for countries with good scores for these indicators, the opposite applies to nations with excessive regulations. Other important regulation indicators for the linkage between trade and income are trading across borders, enforcing contracts, and closing down a business. For the good governance indicators, on the other hand, we are less likely to find significant interactive terms of trade and institutional quality, though that does not apply for the regulatory quality and government effectiveness (bottom 20 per cent countries), and, to a lesser degree, for the rule of law and control of corruption.

While the results demonstrate the importance of institutional quality, they do not imply that the countries with low-quality institutions will never be able to achieve the potential gains from trade. Rather, the outcome demonstrates that these countries are unlikely to benefit from trade with their current institutional setting. Unfortunately, our results do not provide any guidance for institutional reform, which can be an enormous policy challenge for countries that start from a low level of formal institutional development. Following this, the question arises as to how comprehensive and integrated a strategy for institutional change should be and whether partial reforms could also be successful. For getting growth going, Aron (2000), for example, argues that large-scale institutional transformation is hardly ever a prerequisite.

Rather, the initial impetus for growth could also be achieved with minimal changes in institutional arrangements. There is a need to distinguish between stimulating economic growth and sustaining it. Solid institutions appear much more important for the latter than for the former.

Any institutional change also depends on the selection of an appropriate strategy for reform. In principle, there are three basic options: imitation, adaptation and innovation. Countries might have a preference for imitating models of institutional reforms that were successfully applied elsewhere, thus saving time and resources and repeating effective leapfrogging in the field of technology. However, there are clear warnings of simplistic institutional imitation. Institutions that are effective in industrial countries can have quite different outcomes in developing countries, which, for example, have fewer complementary institutions, weaker administrative capacity, higher per-capita costs, lower human capital levels, different technology, and different levels and perceptions of corruption (World Bank, 2001).

According to Rodrik et al. (2004), desirable institutional arrangements have a large element of context specificity due to differences in historical trajectories, geography and political economy or other initial conditions. A vivid indication that there is no blue print of an institutional design is the fact that countries with a similar level of income can have very different institutional settings. Therefore, cross-country studies are of limited value for specifying a reform agenda for any particular country (Jütting, 2003). But there is wide consensus that in the same way in which imported technology needs to be adapted to the local conditions, some degree of adaptation is needed in order to make imported institutions work (Chang, 2005).

Regardless of whether they are imported or innovated, new institutions should be designed to complement what exists. Both the historical European example and the more recent example from China illustrate that institutions tend to function well if they complement the existing environment in terms of other supporting institutions, human capabilities and available technologies (North, 1990, 1994). Importantly, this has much to do with the political economy of reforms. Unless newly designed institutions enjoy a certain degree of political legitimacy among all major stakeholders of the society in question, they are not going to work.

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Appendix A: Country Sample

*Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Central African Republic, Chad, Chile, China, Colombia, Democratic Republic of Congo, Republic of Congo, Costa Rica, Cote d'Ivoire, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Fiji, Finland, France, Gambia, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, **Guinea-Bissau**, Guyana, Haiti, Honduras, Hong Kong, China, Hungary, Iceland, India, Indonesia, Iran, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Republic of Korea, Kuwait, Kyrgyz Republic, Laos, Latvia, Lebanon, Lesotho, **Liberia**, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, Rwanda, Samoa, Country, Sao Tome and Principe, Saudi Arabia, Senegal, Sierra Leone, Singapore, Slovak Republic, Slovenia, **Solomon Islands**, South Africa, Spain, Sri Lanka, **Sudan**, Sweden, Switzerland, Arab Republic of Syrian, Tanzania, Thailand, Togo, Tonga, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, **Uzbekistan**, Vanuatu, Venezuela, Vietnam, Republic of Yemen, Zambia, Zimbabwe*

Note: Countries in italics belong to the *Bottom 30* of countries with the worst scores for the aggregated regulation index. Those in bold are countries with very low scores for regulatory quality (good governance indicator) and should belong to the group with excessive regulations too. Yet they are not included in the Doing Business dataset.

Appendix B: Definition and Data Sources for all Variables

Variable	Definition	Source
Conflict	Number and intensity of internal and external conflicts, 1970-2004	CSCW (2005)
Distance from Equator	Distance from the equator, measured as absolute value of latitude of capital city	Dollar and Kraay (2002) dataset
Engfrac	Fraction of the population speaking English, per cent	Dollar and Kraay (2002) dataset
Eurfrac	Fraction of the population speaking a major European Language, per cent	Dollar and Kraay (2002) dataset
Fittrade	Fitted values of predicted trade by the exogenous variables in a gravity model	Dollar and Kraay (2002) dataset
Fractionalisation	Ethno-linguistic fractionalisation of the population, average for ethno and linguistic diversity, varying base years	Alesina et al. (2003)
Growth	Real growth of Gross Domestic Product per capita in per cent	World Bank (2005a)
GNI	Gross National Income per capita in international US dollars (PPP)	World Bank (2005a)
Good Governance	Set of six good governance indicators, standardised values, range from -2.5 to +2.5, 2004	Kaufmann et al. (2005)
Institution Dummy	Composite regulation dummy for the 20/30/40/50 per cent most or least regulated countries in the sample, 0 and 1, January 2005	
Landlock	Dummy for landlocked countries, 0 and 1	Dollar and Kraay (2002) dataset
Legal Origin	Legal origin dummies for British, French, German, Scandinavian and Socialist, 0 and 1	World Bank (2004)
Population	Population in million, 2003	World Bank (2005a)
Regional dummies	Set of eight regional dummy variables: (1) Sub-Saharan Africa, (2) South Asia, (3) East Asia & the Pacific, (4) Central Asia, (5) Middle East & North Africa, (6) Latin America & the Caribbean, (7) Europe, and (8) North America	World Bank (2005a)
Regulation Indicator	Set of ten business regulation indicators: starting a business, labour market regulation, paying taxes, protecting investors, trading across borders, getting credit, enforcing contracts, closing a business, dealing with licences, registering property, and aggregated Regulation Index, January 2005	World Bank (2005b)
Trade	Total imports and exports of goods divided by Gross Domestic Product, 2003	World Bank (2005a)