# Institutions and the Sectoral Organization of Production

Ana Fernandes*

Bern University of Applied Sciences

January 30, 2016

**Abstract**

Do institutions, such as the Rule of Law, affect the way in which output is generated? This paper provides evidence suggesting that countries with better contract enforcement have disproportionately higher employment shares in sectors that interact more with other input-providing sectors; further, such countries also experience disproportionately higher sectoral value added in those sectors. The data are consistent with institutions affecting the productivity of technological use or adoption, thus acting as sectoral productivity shifters. However, labor (mis)allocation (and not direct productivity loss) is quantitatively the most important effect of poor institutional quality in reducing sectoral value added. These effects are statistically undetected once we rely on data aggregated across the subsectors of manufacturing. Yet, when sectoral data are used, a one standard deviation increment in the Rule of Law indicator results in an increase of the overall value added in the manufacturing sector of 36%. Our findings support the notion that sectoral transformation is grounded on good institutional quality.

JEL Codes: O43, P16.

Keywords: Sectoral organization of output,employment shares, institutions, contractual enforcement, input-output, complexity.

*http://anafernandes.name. Additional affiliation: University of Fribourg. I thank Fernando Alvarez and Omar Licandro for comments, as well as seminar participants at the University of Nottingham, at the ISNIE 2013 annual conference, the 2014 European Public Choice Society Meeting and the 2014 EEA-ESSEM. I am grateful to Yashar Blouri for excellent research assistance.

# 1 Introduction

Do institutions, such as the Rule of Law, affect the way in which output is generated? An extensive literature in economics documents the impact of institutions on development.[1] There is, however, surprisingly scarce evidence on the channels through which institutions affect the organization of output. Additionally, the measurement of effects of institutional progress on output or output growth is generally carried out in aggregate terms, not at the sectoral level.[2]

Should institutions impact economic activity in a profound way, it would be natural to find their effects in the way production is organized. Specifically, does an economy with good legal enforcement of contracts look different from another, where such enforcement is poor, at the level of sectoral productivities? Do these economies employ similar shares of labor across different activity sectors out of the total labor force? What about sectoral value added? We seek an answer to these questions.

In this paper, we examine the implications of poor contractual enforcement for the organization of output across sectors. Imperfections in contract enforcement raise the cost of interacting with others. This suggests that, in environments where such frictions are important, firms would economize on interactions with other firms or economic agents. Conditional on the production of a given good, they would have incentives to adopt more in-house production and avoid acquiring inputs and services from outside the boundaries of the firm (this would be the case provided the contracting costs internal to the firm were less severe than those associated with outside parties). Thus, the quality of contract enforcement would determine the choice of technology, with less efficient technologies going together with poorer institutions. We label this effect the "productivity effect." Notice that, if labor and capital are mobile across sectors, sectoral reallocation of inputs may erode or eliminate such productivity differences over time. This is one compelling, general-equilibrium argument for why the productivity effect may fail to be empirically detected.

Another way in which contractual enforcement could affect the organization of out-

[1] For landmark references see e.g. Knack and Keefer (1995), Hall and Jones (1999), Acemoglu, Johnson and Robinson (2001), and Acemoglu and Robinson (2012) and references therein for a detailed and comprehensive literature overview.

[2] See e.g. Caselli (2005) and references therein.

put, a consequence of the former effect, is by shifting resources toward sectors that interact less with others. This would follow from the fact that costly contractual enforcement would lower input productivity relatively more in sectors where the interaction with other sectors is important and thus reduce labor demand in those sectors. We label this effect the "allocation effect." While factor mobility across sectors may lead to the disappearance of the productivity effect, because that elimination takes place precisely as a consequence of factor mobility leading inputs to sectors where their productivity is the highest, the allocation effect should always be present in the data.

In addition to factor mobility, there are other factors that may lead to the productivity effect not manifesting itself empirically. For example, it could simply be the case that firms only produce when they can use an efficient technology and, whenever contractual imperfections impose too high a cost on a given sector, there is simply no output there. In this scenario, we would see important shifts in the way labor is allocated across sectors (better contractual enforcement raising the employment shares of more complex sectors) but with *measured* productivity not being systematically affected by enforcement quality.

Naturally, both effects on the organization of output could take place simultaneously. Indeed, if the productivity effect is the source of labor reallocation across sectors, these two effects should reinforce each other and contribute to disproportionately higher value added in more complex sectors. We label this the "value added" effect.

The idea that the choice of technology is influenced by the institutional environment has received some attention in the literature. In the context of a Ricardian trade model, Costinot (2009) offers microfoundations for ways in which contractual imperfections may affect the productivity of firms and comparative advantage. In his model, better institutional quality and higher human per worker capital are complementary sources of comparative advantage. Acemoglu, Antràs and Helpman (2007) build on the ideas of Costinot to propose a tractable general equilibrium model showing that contractual imperfections (contractual incompleteness) lead to the adoption of less advanced technologies, and that the impact of contractual incompleteness is more pronounced when there is greater complementary among the intermediate inputs. They further argue (by resorting to a stylized simulation) that the frictions they consider are a quantitatively important source of productivity differences across countries. As in Costinot, they make the case that institutions are a source of comparative advantage.

On the empirical side, Nunn (2007) and Levchenko (2007) show that institutions are an important determinant of the direction of trade flows and, as such, of comparative advantage. Nunn shows that countries with good contract enforcement specialize in the production of goods for which relationship-specific investments are most important. According to his estimates, contract enforcement would explain more of the pattern of trade than physical capital and skilled labor combined. Levchenko extends a Heckscher-Ohlin model to incorporate institutional quality and shows that only the country with better institutions will produce the good where more than one input is required. He finds wide empirical support for the positive effect of institutional quality on comparative advantage.

The paper closest to ours is Cowan and Neut (2007) (henceforth CN) who first proposed the mechanism underlying the productivity effect and empirically estimated it. However, in that paper, no mention is made of the fact that the productivity effect may vanish as a result of factor reallocation across sectors. This possibility arises as a general equilibrium effect whereas CN's analysis is meant as a simple illustration of how institutions may affect productivity. In fact, in one of our datasets covering developed economies, while the allocation effect is arguably present, we do not find evidence of the productivity effect. This is fully consistent with theory, as detailed below. Further, in CN there is neither mention of the allocation effect nor of how the productivity effect impacts sectoral value added. In our data, the allocation effect is quantitatively much more important in raising sectoral value added, for example. To the best of our knowledge, there is no other paper in the literature addressing the allocation effect in connection with institutions and complexity, as presently done.

On a different but related front, Koren and Tenreyro (2007) show that developing countries have disproportionately large employment shares in sectors with high volatility, both idiosyncratic as well as global sectoral risk. Their variance decomposition indicates that more than half the differential in output volatility between the top 5% and the bottom 5% countries in terms of GDP per capita is due to differences in the sectoral allocation of output. This evidence poses a big question mark on the reasons behind such apparently suboptimal allocation of labor to sectors.[3] Our results suggesr that institutional quality may be an important part of the answer.

This paper conducts a cross-country empirical investigation at the sectoral level of the impact of institutions on the organization of a country's output through the lens of complexity. As the model below spells out, complex sectors are disproportionately affected by the quality of contract enforcement, and this manifests itself as a productivity effect at first. Shocks to productivity affect labor demand and this leads to a second effect, the allocation effect. While the productivity effect may vanish due to factor reallocation, the allocation effect will not. Thus, even if the productivity effect vanishes, sectoral value added will still be positively impacted by the allocation effect. Indeed, we find that better contractual enforcement raises relatively more the employment share of sectors that interact more with other sectors; further, good governance also boosts relatively more labor productivity in more complex subsectors of manufacturing. Additionally, these effects reinforce each other at the level of sectoral value added in the manufacturing industry. A consistent ranking across empirical specification suggests that the allocation effect accounts for about two thirds of the impact of institutions on sectoral value added through its disproportionate effect on complex sectors whereas the productivity effect would account for at most one third of that impact. Thus, labor (mis)allocation (and not direct productivity loss) is quantitatively the most important effect of poor institutional quality in reducing sectoral value added. Keeping sample attrition in mind, the data suggest that both effects are more expressive (in terms of significance and size) among countries whose labor productivity ranks in the upper quartiles of the world productivity distribution, and that they vanish in the bottom quartile of the world productivity distribution.

An additional important finding is that the disproportionate impact of institutions on the sectoral value added of complex sectors is not detected when aggregated data over manufacturing subsectors are used. Indeed, when we aggregate over the eighteen subsectors of manufacturing in our data, we no longer find any statistically significant disproportionate effect of institutions on value added in complex sectors. Yet, if we com-

[3] We label this patter suboptimal because it differs from that of developed countries as documented in Koren and Tenreyro. Presumably, more developed economies face less restrictions in the choice of technology and in the sectoral allocation of output.

pute the impact of a one standard deviation improvement in the Rule of Law indicator, for example, while using sectoral data, we find that this results in an increment of 36% in manufacturing value added.

Our paper is also related to recent work by Herrendorf and Valentinyi (2012) and Hsieh and Klenow (2009) among others. Relative to the literature, Herrendorf *et al.* propose a finer, five-sector decomposition of aggregate output to identify which sectors contribute the most to the lower total factor productivity (TFP) of developing countries. They find that, in equipment, construction, and food the sectoral TFP differences between developing countries and the United States are much larger than in the aggregate. However, in manufactured consumption the sectoral TFP differences are about equal to the aggregate TFP differences, and in services they are much smaller. Our results on the productivity effect are complementary to these.

Hsieh and Klenow (2009) find sizeable differences in the productivity of both labor and capital across firms within a given industry in both India and China, as compared to the United States. Were capital and labor reallocated to equalize marginal products to the extent observed in the United States, they estimate manufacturing TFP gains of 30%–50% in China and 40%–60% in India would materialize. This resonates with our findings, though our data only allows us to analyze productivity effects at the sectoral level.

We believe our results are one more piece in the puzzle of understanding the process of development. The evidence uncovered here suggests that institutions affect productivity in a quantitatively important way: companies do not produce using an ideal technology but instead adapt their technological choice taking into consideration the effects of the quality of legal contract enforcement on productivity. They do not produce in identical sectors across countries, as would be the case if productivity were immune to institutional quality; instead, they produce where they can, meaning in sectors where productivity is relatively less adversely affected by poor institutional quality. Countries that vary greatly in the quality of contract enforcement are thus likely to look rather different at the level of sectoral employment shares. The policy implications of our analysis are deep: it is not possible to foster productivity in particular sectors or to expect developing countries to follow a path of sectoral transformation initiated by other developed countries unless their institutions also mimic those of developed economies.

The paper is organized as follows. The next section lays out the model and it empirical implications, as well as the estimation procedure. Section 3 describes the data and results. Section 4 concludes. Tables are presented in section 5.

# 2 Model and Estimation Procedure

The goal of this section is to provide theoretical guidance to the empirical work, below. The stance taken has been that of identifying a set of general effects that should take place in the data should institutions have a disproportionate positive effect on the sectoral productivity of complex sectors. Should such effects be present in the data, further investigation and theorizing into more specific channels for this to take place may be warranted.

## 2.1 Model

We begin with the following decomposition of value added per worker in a given country:

$$\frac{Y_c}{L_c} = \sum_{i=1}^{N} \underbrace{\frac{Y_{ic}}{L_{ic}}}_{\text{Labor productivity in sector } i} \underbrace{\frac{L_{ic}}{L_c}}_{\text{Share of sector } i \text{ in total employment}} \tag{1}$$

where $c$ denotes country and $i$ is for sector. $Y_c$ is value added in country $c$ and $L_c$ the number of workers engaged in the production of $Y_c$. $Y_{ic}$ and $L_{ic}$ are value added and employment at the sector level, and there are $N$ sectors of activity in the economy. Equation (1) decomposes output per worker into a sum of products of two factors, namely labor productivity in a given sector and that sector's share of total employment. Each parcel in this sum is the value added of a particular sector (divided by the total number of workers in that country). In what follows, we will refer to the product of a sector's productivity times the employment share employed by that sector as sectoral value added.

We think of output in sector $i$ as being generated by a production function

$$Y_{ic} = A_i(\mathcal{C}_c) F_{\mathcal{C}} \left( K_{ic}, L_{ic}, \sum_{j=1}^{J_i} X_j; \mathcal{C}_c \right), \tag{2}$$

where $\mathcal{C}_c$ is a measure of the quality of contract enforcement in country $c$, $A_i$ a measure of total factor productivity in sector $i$ possibly affected by the quality of contract enforcement, $K_i$ and $L_i$ inputs of capital and labor employed in this sector, and $X_j$ the amount of intermediate inputs acquired by sector $i$ from sector $j$, out of $J_i$ sectors with whom sector $i$ transacts. We choose to condition the $F(\cdot)$ part of the production function on $\mathcal{C}_c$ to allow for a more general and deeper impact of institutions on production possibilities. For example, firms may have to adopt a less capital intensive way to generate output if facing a poor contracting environment.[4]

In line with the literature (see references above, namely Costinot), we postulate that lower quality of contract enforcement is harmful for production processes that have many interactions with other parties. If, say, a company has to hire many workers, acquires many inputs from other sectors (and thus from outside sources) and engages a variety of different types of capital, it becomes heavily dependent on these transactions and, as such, on the quality of contract enforcement to make them happen (and to provide incentives to its business parties toward good outcomes). By comparison, a good that can be produced using only a few intermediate inputs and which neither requires specific capital nor engaging many laborers will be much more insulated from variations in the quality of contract enforcement. We conclude from here that good contract enforcement is especially beneficial for sectors that rely heavily on interactions with others.

More formally, we assume that, for two values of contract quality $\mathcal{C}_1$ and $\mathcal{C}_2$, with $\mathcal{C}_2 > \mathcal{C}_1$,

$$A_i(\mathcal{C}_2) F\left(K_i, L_i, \sum_{j=1}^{J_i} X_j; \mathcal{C}_2\right) > A_i(\mathcal{C}_1) F\left(K_i, L_i, \sum_{j=1}^{J_i} X_j; \mathcal{C}_1\right), \quad (3)$$

$$A_i(\mathcal{C}_2) \frac{\partial F\left(K_i, L_i, \sum_{j=1}^{J_i} X_j; \mathcal{C}_2\right)}{\partial K_i} > A_i(\mathcal{C}_1) \frac{\partial F\left(K_i, L_i, \sum_{j=1}^{J_i} X_j; \mathcal{C}_1\right)}{\partial K_i}, \quad (4)$$

[4] In a different context, Lewis (2011) has identified instances where firms start adopting less capital intensive technologies as a response to an increase in low-skilled labor abundance brought about by immigration.

$$A_i\left(\mathcal{C}_2\right)\frac{\partial F\left(K_i, L_i, \sum_{j=1}^{J_i} X_j; \mathcal{C}_2\right)}{\partial L_i} \quad > \quad A_i\left(\mathcal{C}_1\right)\frac{\partial F\left(K_i, L_i, \sum_{j=1}^{J_i} X_j; \mathcal{C}_1\right)}{\partial L_i}. \tag{5}$$

Equation (3) says that better contract enforcement will raise output, while equations (4) and (5) indicate that this effect will carry over to the marginal products of labor and capital. Note that these equations are written for the initial levels of the inputs.

Consider now the effects of reducing contractual quality from $\mathcal{C}_2$ to $\mathcal{C}_1$ in a given country, a reduction taking place for exogenous reasons that remain otherwise orthogonal to the functioning of the economy. Firms operating competitively equate the marginal product of inputs to their opportunity costs, respectively wages and the interest rate. Since, by assumption, lower contracting quality lowers the marginal product of inputs, it follows that sectors where the reduction in productivity due to lower contracting quality is greatest would suffer the largest reduction in their optimally chosen input levels. If there is no international factor mobility (closed economy), then full employment of all inputs would require wages and interest rates to decline. If there is factor mobility and the country in question is a small open economy, then factors would migrate. Either way, there would be a shift in input usage toward industries where the productivity effects of lower contracting quality were felt the least and away from those production processes that are contract intensive.

Some or all of the productivity differences might vanish as a result of factor mobility. If returns to inputs became fully equalized after factor movements take place, the productivity effect would not be empirically detectable: inputs would earn the same return and thus be equally productive across sectors. Any general changes in productivity, felt across all sectors, would be empirically captured by the constant; but if factor mobility equated productivities across sectors, the differential effect would be null. Still, either because of potential sectoral specificities or other frictions, it is possible that the returns to capital and labor may fail to be fully equalized.[5] Another important issue is whether contract quality affects essentially only one input, say capital. Then, (5) would not hold because it is written for the initial values of the inputs. However, capital would adjust as described above and its level would rise in sectors where institutions improve contract-

[5] Levchenko (2007) provides a theoretical model where the earnings to capital are not equalized in the presence of institutional imperfections related to contract enforcement.

ing quality. Because in those sectors the capital stock would be higher than initially, labor would become more productive, at least initially, till, once gain, movements of labor across sectors equalized wage rates. When frictions to full equalization exist, labor productivity could remain higher in sectors where institutional quality initially raised only the productivity of capital. Whether or not productivity differences remain or are fully eliminated by means of factor mobility is an empirical matter. The allocation effect, however, should always be present. As a result, so should the value added effect. We therefore postulate the possibilities below, subsequently explored in the empirical analysis.

Countries with good contract enforcement should have:

1. disproportionately higher employment shares in complex sectors,
2. disproportionately higher sectoral value added,
3. disproportionately higher labor productivity provided there is no full factor return equalization across sectors,

relative to less complex sectors.

## 2.2 Estimation Procedure

From the previous discussion, we set out to estimate the following equations:

$$\ln\left(\frac{L_{ict}}{L_{ct}}\right) = \alpha_1+\beta_1 \text{enforcement}_{ct}.\text{complexity}_{i,US,t}+\mu_{1i}+\mu_{1c}+\mu_{1t}+\mu_{1it}+\mu_{1ct}+\varepsilon_{1ict}, \quad (6)$$

$$\ln\left(\frac{Y_{ict}}{L_{ict}}\right) = \alpha_2+\beta_2 \text{enforcement}_{ct}.\text{complexity}_{i,US,t}+\mu_{2i}+\mu_{2c}++\mu_{2t}+\mu_{2it}+\mu_{2ct}+\varepsilon_{2ict}, \quad (7)$$

$$\ln\left(\frac{Y_{ict}}{L_{ict}}\right)+\ln\left(\frac{L_{ict}}{L_{ct}}\right) = \alpha_3+\beta_3 \text{enforcement}_{ct}.\text{complexity}_{i,US,t}+\mu_{3i}+\mu_{3c}+\mu_{3t}+\mu_{3it}+\mu_{3ct}+\varepsilon_{3ict}. \quad (8)$$

Here, $i$ denotes sector, $c$ country and $t$ time. The interaction terms on the right-hand side cross country-specific measures of the quality of contract enforcement with measures of sector complexity, the latter based on US sectoral allocations. The terms $\mu_{1i}$ and $\mu_{1c}$ are sector and country dummies, whereas $\mu_{1t}$ is a time dummy; $\mu_{1it}$ and $\mu_{1ct}$ are interactions of sector and time dummies and of country and time dummies, respectively. Similar notation applies for equations (7) and (8). The interaction of country and sectoral variables, where the latter pertain to a specific country (the US) and thus is a sectoral measure invariant across countries, was first made popular in the work of Rajan and Zingales (1998) addressing the link between financial development and growth. The crossing of the contract enforcement quality variable with the complexity sectoral measure captures the notion that contractual enforcement is relatively more beneficial for sectors which have more complex productive structures.

Following the discussion above, we think of contracting costs to be positively related to the intensity of exchanges that a sector has to carry out with other sectors. We label this variable "complexity." In line with the literature (see e.g. Blanchard and Kremer (1997), Levchenko (2007)), we use a Herfindahl index computed from Input-Output matrix data to calculate the measure of sectoral complexity. The Herfindahl index is calculated for each sector as follows. First, the column data is transformed into shares (the initial column magnitude is divided by the sum of that column's total), whose squared values are then added up. The larger the concentration, the less intense the interaction with other sectors (the index takes the maximum value of unity in the case that a sector's inputs all come from a single sector). In order to correctly measure complexity, we need its reciprocal and so use 1/Herfindahl as our measure of complexity. As in Rajan and Zingales, we use a measure (of complexity) that is common to all countries, calculated from US input-output data. The idea is that the productive structure of that country would face the least contracting constraints of all, thus reflecting a kind of "ideal" measure of sectoral complexity. Fixing this measure to a single country is also beneficial in terms of reducing possible simultaneity bias in our findings.

From the model presented in section 2.1, we expect $\beta_1$ to be positive and significant reflecting the allocation effect of contracting quality. To the extent that there is no full factor return equalization, estimates of $\beta_2$ should be positive and significant. However, insignificant estimates of $\beta_2$ would be consistent with theory as discussed. If the allocation effect is a consequence of productivity shifts induced by institutional quality on complex sectors, allocation and productivity effects should reinforce each other. We would therefore expect $\beta_3$ to be positive and statistically significant, and its magnitude to at least weakly exceed $\beta_1$: $\beta_3 \geq \beta_1$.

# 3 Data and Estimation

## 3.1 Data

**Industrial Statistics** We use two main datasets regarding employment and productivity measures. One is INDSTAT2 2012, the Industrial Statistics Database in 2012 (2-digit level of ISIC code, revision 3) from the United Nations Industrial Development Organization (henceforth referred to as the UNIDO dataset). The other is the Organization for Economic Cooperation and Development's STAN database for Structural Analysis, 2-digit level of ISIC revision 3 (henceforth STAN dataset). We collect sectoral employment and productivity measures (based on value added) from both sources. UNIDO contains only data on manufacturing sectors whereas STAN has a more general sectoral coverage but it only covers developed economies. We find this diversity useful in interpreting the results.[6]

In order for meaningful comparisons of cross-country productivity to be made, sectoral value added must be converted to a common currency, preferably through Purchasing Power Parity (PPP) conversion factors as these are more stable than conventional exchange rates. UNIDO provides value added in both national currency at current prices and in current US dollars, and both were used in this study. Unless otherwise indicated, the results shown rely on the series expressed in current national currency units converted into dollars (USD) by using World Bank PPP conversion factors.[7] The results were broadly similar across these two different estimates of value added, which we find reassuring in the interpretation of our results. STAN provides volume indexes of value added (variable VALK). Those indices are provided with base year 2000 in units of national currency. They are then converted into a common currency (USD) using PPP conversion factors.

It is important to note, however, that the results on employment shares and the impact that institutions have upon them should be completely immune to currency units. Those only affect level measures of value added.

[6]Both UNIDO and STAN are used by Koren and Tenreyro as well.

[7]World Bank, International Comparison Database.

**Complexity** The measure of complexity comes from the Input-Output US matrix in STAN. Input-Output data for the US in STAN is only available for the years 1995, 2000 and 2005. For this reason, we can only compute the interaction term for these three years.

**Governance Indicators** We use the *Worldwide Governance Indicators* (2011) provided by the World Bank. Our preferred measure of the quality of contractual enforcement is the "Rule of Law." According to the source, Rule of Law "reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence." Thus, the Rule of Law indicator measures instances of the quality of contract enforcement, as intended. The earliest datapoint for this indicator is 1996 and, as a result, we construct the product of the 1995 complexity measure times the 1996 Rule of Law. The variables used in the interaction terms for the other years (2000 and 2005) are each measured in the corresponding years.[8] We also report the results obtained using the other five governance indicators provided by the same source ("Voice and Accountability," "Political Stability," "Government Effectiveness," "Regulatory Quality," and "Control of Corruption"). The results are reassuringly similar across indicators.

**Interest Rate and Financial Indicators** We consider three interest rate measures: the lending rate, the interest rate on treasury bonds and on treasury bills. They are collected from the International Monetary Fund's *International Financial Statistics* (2012). We additionally use a host of measures concerning financial institutions and markets, from the World Bank's *Global Financial Development Database* (2013). The variables selected follow Čihák, Demirgüç-Kunt, Feyen, and Levine's (2012) proposed measures for benchmarking financial systems. They include measures of financial depth, access, efficiency and stability for both financial institutions and financial markets.

In the regressions presented in section 5, several subsets of the above financial indicators are used. When the column head reads "Finance," all the above indicators were included as independent variables; "Subset Finance" corresponds to the variables bank,

[8] E.g. "Rule of Law" measured in 2000 times "1/Herfindahl" measured in 2000.

stkmarkt, stkmktturn, and volstocks; "Financial Markets" indicates that the variables stkmarkt, mktcap, stkmktturn and volstocks were included as financial regressors; and "Subset Financial Markets" restricts the set of financial indicators to stkmarkt, stkmktturn and volstocks.

**Table A – Definition of Financial Variables**

| **Variable name** | **Corresponding regressor name** |
|---|---|
| Bank private credit to GDP (%) | bank |
| Stock market cap. (%) + outstanding dom. priv. credit to GDP (%) | stkmarkt |
| Bank accounts per 1,000 adults | bankacc |
| Market cap. outside top 10 largest companies to total market cap. (%) | mktcap |
| Net interest margin (%) | netintm |
| Stock market turnover ratio (value traded/capitalization) (%) | stkmktturn |
| Bank Z-score | zscore |
| Volatility of stock price index | volstocksvolstocks |

**Trade** The degree of country openness (the sum of imports plus exports divided by GDP) was obtained from the World Bank's *World Development Indicators* (2015).

## 3.2 Results

All tables are presented in section 5. They are shown for the specifications described in equations (6), (7) and (8), where the data for all the three available years is used, possibly augmented with other explanatory variables.[9] Therefore, all regressions have time, sector and country dummies, as well as dummies resulting from the interactions of country and time and of sector and time dummies. Further, standard errors are always clustered at the sector and country level.

[9] We have also performed individual-year regressions (not shown) but the results were qualitatively identical.

### 3.2.1 Allocation Effect

**Baseline** Tables 1A and 1B present the estimates of equation (6) for the UNIDO and STAN datasets, respectively (only estimates of $\beta_1$ are shown). Rule of Law does influence relatively more the share of labor employed in more complex sectors and in a statistically significant way across both datasets. Statistical significance is higher in UNIDO (the estimate of $\beta_1$ is significant at the 0.1%) than in STAN (1%). The results in UNIDO generalize to other indicators of governance and this is also the case in the STAN dataset, but for Political Stability, whose interaction with complexity does not result in a statistically significant coefficient.

The magnitude of the effects is nontrivial. We provide a "back-of-the-envelope" calculation to gauge their quantitative relevance. Because the dependent variable is in logs, the coefficients are to be interpreted as the percentage change in the employment share of a given sector whenever the right-hand side interaction variable changes by unity. Thus, a one unit change in the right-hand side product of enforcement times complexity in a given sector will deliver a 3.1% increase in the employment share of that sector according to the UNIDO estimate of $\beta_1$. To put things in perspective, one standard deviation in the Rule of Law indicator is 0.99 in the UNIDO dataset and the least complex sector has a complexity index of 1.97 in that dataset. For this sector, a one standard deviation improvement in the Rule of Law would lead to a 6.04% increase in its employment share. In STAN, despite the broader sectoral coverage, the least complex sector is the same as in UNIDO. Because of the smaller subset of countries represented in STAN, Rule of Law has a lower variance in this sample (0.55). In STAN, a one standard deviation in the Rule of Law indicator would raise the employment share of the least complex sector by roughly 3%.

**Time Sensitivity** To the extent that the indicators of governance are contemporaneously correlated with the employment share, it would be desirable to use lagged values of those indicators. While the data used to compute the complexity indicator is only available for the three years mentioned above, employment share data is readily available for all years from 1996 till 2007 (and beyond). We thus perform two additional regressions to address endogeneity concerns. We use leading values of the dependent variable, dated one and two years ahead of the interaction term. For example, we construct a series with the 2006, 2001 and 1996 values of the employment share which we regress on the interaction of the complexity and governance indicators measured in 2005, 2000 and 1995. We label this the "one lead" regression. We do the same for the employment share measure two years ahead of the interaction terms (thus regressing employment shares in 2007, 2002 and 1997 on the available interaction years). This is the "two lead" regression. Results are presented in Tables 2A and 2B. Estimates of $\beta_1$ are remarkably stable there. The stability of the coefficients in the regressions with leading employment shares suggests that endogeneity is not a serious concern for our results.

**Splitting the UNIDO Sample** Since the UNIDO sample covers all countries (subject to data availability), we next try to break it into tiers reflecting percentiles of the world's productivity distribution. The question we want to address is whether the effects of interest manifest themselves in an heterogeneous form in different parts of that distribution. Because we only have value added in manufacturing in the UNIDO sample, we took a measure of output per worker from the Penn World Tables (PWT 7.1). We used the variable "rgdpwok:" PPP converted GDP chain per worker at 2005 constant prices. Year 1995 was chosen since it is the earliest date in our sample. The correlation of rgdpwok with other per person and per worker variables was very close to unity. Countries were then ranked according to this variable and categorized into several groups: 10 or 20% least productive economies, above or below median productivity, middle 50% (above the 25% least productive and below the 75% most productive) and, finally, the sample is split so as to include or exclude the countries in the OECD STAN sample.

Results are displayed in Table 3A. Because of attrition in sectoral data, the regressions covering the least productive groups often have significantly fewer observations than those covering wealthier economies. With this caveat in mind, examination of the regressions performed for the 10 and 20% least productive countries finds no trace of a disproportionate effect of institutional quality on complex sectors. There is a strong and significant effect for economies above median productivity and the strongest effect (in terms of the $\beta_1$ estimate) is found in the economies ranking in the 25%-75% productivity group. Finally, we split the sample according to the countries in the STAN database, containing more developed economies. Though we only have manufacturing subsectors in UNIDO (while STAN displays broader sector exposure), the effect of interest is not found there (last column). The magnitude of the estimated coefficients in this table, when significant, is close to 0.03, as in the baseline case. Our estimates suggest that the effect of interest appears to be absent in the least productive countries (columns (3), (4) and (6)), and that its strongest manifestations take place in upper quartiles of the world productivity distribution (columns (5) and (7)). However, sample attrition particularly acute at the bottom end of the productivity distribution suggests taking this interpretation with caution.

We try to validate the possibility that, at least for manufacturing subsectors (those covered in UNIDO), the allocation effect is absent in the STAN database. It could be that the allocation effect detected in Table 1B were driven by services, for example, thus by sectors outside manufacturing. Consequently, we split STAN into manufacturing and other sectors and estimate $\hat{\beta}_1$ in those two subsamples. Results are in Table 3B. Column (1) shows the baseline estimate from before. In column (2), only manufacturing subsectors are considered whereas, in (3), manufacturing is excluded. Although the allocation effect is captured when the whole sample is considered, therefore including manufacturing as well as all remaining sectors, this is no longer the case in either of the two subsamples in Table 3B. While the lack of significance of $\hat{\beta}_1$ in column (2) agrees with the results in column (9) of Table 3A, the fact that $\hat{\beta}_1$ is also not significant when the remaining sectors are considered (column (3) in Table 3B), suggests that this may well be the result of a smaller sample size: partitioning the sample leads to statistically insignificant regressors across both subsamples.

**Additional Controls** Next, we include additional controls to check for the possibility that omitted variables might be biasing the results despite our inclusion of country, sector and time dummies, as well as the interaction of country and time as well as sector and time dummies, in all regressions. Results are displayed in Tables 4A and 4B. We start with the UNIDO results (4A).

**UNIDO** Column (1) presents the baseline estimator from before, crossing our preferred institutional indicator with the complexity variable. In column (2), we include complexity as an independent regressor and, in column (3), we add all governance indicators as individual regressors. The variable of interest retains its significance and magnitude.

Next, we consider the possibility that a country's openness may affect the degree of competitiveness experienced at the sectoral level. If so, this could modify the intensity of the effect we are seeking to identify. For example, for a country with a large degrees of exposure to foreign competition, it may no longer be possible to use technologies that are too inefficient relative to the world's technological frontier at a given moment. As a result, we may no longer be able to detect the productivity effect (because competitiveness prevents inefficient companies from remaining in production). Even if the productivity effect vanished as a result of foreign competition, openness may still have an impact in the degree to which inputs move across sectors, precisely in order to equalize marginal products. We thus bring in the variable Trade (the sum of exports plus imports divided by GDP), in column (4). Additionally, in order to allow for the possibility that the effects of openness may be disproportionately more intense in complex sectors, we interact it with complexity (variable complex_trade). Column (5) includes both controls which are also included in the remaining specifications (except for columns (15) and (16)). Trade is generally not significant, in the table as a whole, and the same is true of the interaction between complexity and trade. Our sample thus suggests that the degree of openness is not statistically relevant for the allocation effect (at least not so above and beyond the part of it that may already be captured in the dummy variables). In addition, the coefficients associated with both variables are very small.

We proceed and consider interest rates. In a competitive environment, interest rates should equal the marginal product of capital. It could be that the effect of complexity manifests itself predominantly on physical capital. We experiment by including all three interest rates in our dataset (the lending rate (lr), the interest rate on government bonds (gb) and the interest rate on treasury bills (tb)), first in levels (column (6)), and then in logs, (7). No coefficient is significant. We proceed by interacting the interest rates with sectoral dummies, thus allowing the effect of interest rates to be sector specific. In column (8), we include three groups of interest rate effects resulting from the product of each interest rate with sectoral dummies. The effect of interest loses significance. We perform an F-test for the joint significance of each group of interest rate variables (e.g. one test for the joint significance of the 18 dummies resulting from the crossing of the tb variable with the 18 sectoral dummies, and similar ones for the gb and lr product variables). Only the variables associated with tb are significant and we repeat the previous regression but now including only the product of tb and sectoral dummies. The result is in column (9). There, the coefficient on the interaction between Rule of Law and complexity is once again significant (at the 1% level), and its magnitude exceeds that of the baseline.

We further include financial variables concerning different measures of macroeconomic performance in financial markets (i.e. the fraction of stock market capitalization corresponding to companies outside the top 10) and of financial institutions (e.g. the ratio of bank private credit to GDP). Access to finance and an adequate functioning of financial institutions are potentially important parameters in the process of technology adoption as they may limit a company's access to external financing, for example. These are displayed in columns (10) to (17). Data limitations (the inclusion of financial indicators sometimes results in severe sample attrition), leads us to consider progressively smaller subsets of these variables. Simultaneous inclusion of all financial variables, listed in Table A, on top of existing controls is not possible as too few observations remain. We then consider different subsets of those variables as a means of addressing sample attrition. One such example is column (10), where the first year of coverage of the financial variables would have been 1995 or earlier, thus including all our remaining sample. Column (11) restricts the financial variables to those concerning financial markets, whereas in (12), only the subset of the latter whose coverage started on 1995 or earlier is considered. The coefficient associated with the crossing of Complexity and the Rule of Law retains significance at the 5% level. Estimates range roughly between 0.024 and 0.03. Financial variables are generally not significant with the exception of the indicator of stock market volatility, variable *volstocks* in the tables. Point estimates of the corresponding coefficients are, in addition, very small. We proceed by eliminating the financial variables from the right-hand side (but for volstocks), with the results in column (13).

It is possible that the effects of finance may be disproportionately felt in complex sectors. We interact the financial variables, one at a time, with the complexity indicator. In column (14), the product variable complex_volstocks is additionally included, indicating the product of complexity and volstocks. The latter is insignificant and the point estimate of the associated coefficient essentially null. Results when any of the other financial variables, crossed with complexity, were included instead were similar (not shown).

The last columns of Table 4A show our preferred specification for the allocation effect. We removed Trade and complex_trade as well as complex_volstocks from the explanatory variables, as they were not statistically significant before and the associated point estimates were very small. Column (15) shows the result. The effect of interest is significant at the 1% level, with a point estimate of 0.03, similar to the baseline. In (16), we restrict the sample to countries above median productivity with identical results.

**STAN** Results from the STAN database are very similar to those in UNIDO, as displayed in Table 4B. The baseline magnitude of the coefficient of interest is slightly lower than in UNIDO (0.027 in STAN compared with 0.031 in UNIDO), and the significance of the STAN estimate also lower (1% in STAN relative to 0.1% in UNIDO). But the pattern of results as additional controls are included is quite similar across both samples. As in UNIDO, including complexity as an independent regressor as well as governance indicators, trade, and trade interacted with complexity leave the estimate of $\beta_1$ and its statistical significance essentially unaltered (columns (1) through (5)). Interest rates in levels of logs are not significant. Once interacted with sectoral dummies, an F-test of the joint significance of each group of product variables (e.g. lr interacted with sectoral dummies, the same for tb and gb) has them all statistically significant and all are retained in columns (8) through (14) of Table 4B. Financial variables are not significant. In column (10), where indicators related to the functioning of financial markets are included, the coefficient of interest loses significance but the inclusion of those regressors leads to a large reduction in sample size. In addition, point estimates of the coefficients associated with financial indicators are very small. Once we restrict the set of financial market indicators to those with coverage starting in 1995 or earlier (column (11)), significance is restored (at the 5% level). For the sake of comparison with UNIDO, we remove all financial indicators but for stock market volatility (column (12)), and additionally interact it with complexity (13). These two variables are not significant. Interacting the remaining financial variables with complexity and including them, one at a time, as additional regressors does not produce any statistically significant coefficient for the financial variables (not shown), while the effect of interest retains significance at least at the 5% level. Column (14) shows our preferred specification, without financial variables, Trade and trade interacted with complexity. The coefficient estimate of complexity interacted with Rule of Law is significant at the 1% level, and slightly lower than the baseline, now 0.025.

We read the results in tables 4A and 4B as a validation of the allocation effect, thus confirming that institutional quality disproportionately raises the employment share of complex sectors.

#### 3.2.2 Productivity Effect

**Baseline** Tables 5A and 5B present estimates of equation (7). We now obtain strikingly different results across the two datasets. While we find evidence of the productivity effect when using the UNIDO dataset, this is not the case under STAN data. Comparing across governance indicators, estimates of $\beta_2$ are significant at least at the 0.1% level for all but one governance indicator under UNIDO. The effects are quantitatively important. As before, because the dependent variable is in logs, estimates of $\beta_2$ indicate the percentual change in productivity in a given sector following a unitary change in the interaction term on the right-hand side. Thus, a unitary increment of the product of institutional quality and complexity in a given sector would result in an increase of 1.3% in the productivity of that sector. Using the numbers above, it follows that the productivity of the least complex sector would increase by 2.5% following a one standard deviation increment in that governance indicator (and by 20.3% in the most complex).

For STAN, the coefficient of interest is never significant, sometimes has the wrong sign, and the size of the estimated coefficient is very small. As discussed earlier, it is possible for the productivity effect not to persist in the data under several scenarios. One such possibility is the presence of full factor mobility (that equalizes factor productivity across sectors). Due to the lack of evidence of the productivity effect in STAN, we no longer report results coming from that database in the sections below. Therefore, unless explicitly indicated, all remaining tables and results pertain to the UNIDO dataset.

**Time Sensitivity** In Table 6, regressions of leading series of productivity values on past complexity and governance interactions are shown, replicating those performed for the allocation effect. Estimates of $\beta_2$ from these noncontemporaneous regressions remain significant. The size of $\hat{\beta}_2$ is somewhat lower in the two-lead regression (the estimate in column (3) is only 0.009 compared with 0.013 in the baseline). This would be consistent with productivity-equalizing factor mobility taking place in periods $t+1$ and $t+2$, in response to complexity-induced shocks in $t$. As such, we would expect the productivity effect to become smaller over time and to possibly disappear eventually, as is the case in the STAN dataset.

Despite the reduction in the point estimate of $\beta_2$, the fact that the sign is retained as well as its significance once again suggest that endogeneity is not a serious concern.

**Splitting the UNIDO Sample** We perform additional regressions by splitting the sample in income groups, as above. Results are presented in Table 7. The flavor of the results is the same as before. Attrition makes sample size smaller for poorer economy groups. The effect of interest is not present among the less productive economies. The productivity effect is the most significant for countries above median productivity (column (5)), and, among groups where the estimate of $\hat{\beta}_2$ is statistically significant, quantitatively largest for countries ranking above median productivity.

**Additional Regressors** We proceed by including additional regressors while retaining all the dummy variables specified earlier. Results are presented in Table 8. The general flavor of the results is similar to those in table 4. Estimates of $\beta_2$ are positive and generally significant though their magnitudes are consistently lower than those of $\hat{\beta}_1$. The coefficient of interest remains significant and retains its magnitude when complexity is considered as an independent regressor (column (2)), and the same is true when other institutional measures are independently entered, as well as Trade and the interaction of Trade with complexity (columns (3) to (5)). Levels of all interest rates in our sample are added in column (6) but only tb is significant among them. Column (7) retains only the latter and column (8) additionally drops the variable complex_trade as it is not significant and its coefficient is very small. The specifications in columns (6) to (8) are rerun in columns (9) to (11) but now using the logs of the interest rate values. Now, only the log of tb is significant. Comparing columns (8) and (11), because the coefficient on log_lr is much larger and also more significant than the one on lr, and additionally because keeping tb carries a much less severe loss of observations (3006 in column (11) compared to 957 in (8)), we retain log_lr and drop tb. Columns (12) to (14) show the outcome of considering interactions of the interest rates with sectoral variables. Unlike in the estimation of the allocation effect, these product variables are not statistically significant. We thus retain log_lr in the remaining of the table while dropping other interest rate variables.

Columns (15) to (18) add the regressors pertaining to the functioning of financial markets and institutions. Including all (in (15)) results in a drastic sample reduction and therefore subsamples of those variables are further considered. Column (16) restricts the sample to variables whose year of initial coverage is 1995 or earlier, restoring significance (at the 5% level) to $\hat{\beta}_2$. When the set of financial variables relating to financial markets is considered (column (17)), possibly due to sample attrition, that significance is lost. Column (18) retains only the subset of the latter with a coverage consistent with the years included in the remaining of our sample. Once again, $\hat{\beta}_2$ is significantly estimated (at 5%). In column (19), the variable stkmarkt is dropped as it is not significant and has a very low point estimate. All remaining financial variables lose significance as well. In view of this, we re-estimate the productivity effect by removing all financial variables (but including log_lr), and eliminating Trade as well for the same reason. This is our preferred specification of the productivity effect. The coefficient of interest is significant at the 1% level with a point estimate of 0.0133.

#### 3.2.3 Sectoral Value Added

One remaining question is whether allocation and productivity effects reinforce each other. That being the case, sectoral value added would be disproportionately higher in complex sectors of countries with good institutions. The log of sectoral value added is simply the sum of the log of sectoral employment shares and the log of sectoral productivity. Due to the linearity of OLS estimators, provided the independent variables remained the same, the estimator of the coefficient of interest (relating the interaction between sectoral complexity and a country's institutional quality to sectoral value added) would correspond to the sum of the coefficients reported above for the allocation and productivity effects.[10] In the present case, but for attrition, the set of independent variables is the same. For the sake of completeness, we nonetheless present results for the estimation of equation (8) in table 9. As was the case for the productivity effect, data from STAN does not support the value added effect and we only show results for UNIDO.

Estimates of $\beta_3$ are significant across all columns of the table (but (8)). Results mimic those presented earlier when allocation and productivity effects were analyzed. Estimates of $\beta_3$ are routinely larger than the sum of $\hat{\beta}_1 + \hat{\beta}_2$. For UNIDO, data support the value added effect as well. Despite the presence of the allocation effect, we do not find evidence of the value added effect using the STAN dataset (not shown).

### 3.2.4 Relative Importance of Allocation and Productivity Effects

One important question concerns the relative magnitude of allocation and productivity effects. Which effect is most relevant for sectoral value added: is it labor reallocation across sectors, responding to and enhancing the effects of higher productivity, or is it the productivity effect itself? Sectoral value added, in levels, is the product of the employment share and that sector's productivity. In turn, the growth rate of that product is the sum of the individual growth rates of the employment share and productivity. If we consider a perturbation coming from the Rule of Law indicator, we may use the estimates of $\beta_1$ and $\beta_2$, multiplied by the complexity of a given sector and the standard deviation of the Rule of Law indicator, to compute the two parcels whose sum adds up to the growth rate of the level of sectoral value added.

Because the product of complexity and the standard deviation of the Rule of Law is common to both parcels, it suffices to compare the magnitudes of $\hat{\beta}_1$, $\hat{\beta}_2$ and $\hat{\beta}_3$. Therefore, we examine the size of the estimates of the coefficient associated with the interaction term – institutions crossed with complexity – across tables 4A (allocation effect), table 8 (productivity effect) and table 9 (value added effect). Because regressors

[10] The new coefficient would have a distribution centered on the sum of the reported coefficients for the allocation and productivity effects. In other words, if $\hat{\beta}_{sh}$ is the estimated coefficient for the allocation effect and $\hat{\beta}_p$ is the estimated coefficient for the productivity effect, the estimate for their joint effect, $\hat{\beta}_{va}$ will corresponds to their sum, $\hat{\beta}_{va} = \hat{\beta}_{sh} + \hat{\beta}_p$, provided the independent variables remain the same.

are not kept constant across the full extent of different specifications in those tables, we rely on columns (1) through (3) where the right-hand side variables are identical.

Across these columns, it is consistently the case that the estimated coefficient of the allocation effect (read from table 4A) is roughly twice as large as the estimate of the estimated coefficient of the productivity effect (read from table 8). And that the sum of these coefficients is slightly below the estimate of the value added coefficient in table 9. (For example, across columns (3) of the three tables, we see that the estimate of the allocation effect is 0.03124 in table 4A, the estimate of the productivity effect is 0.0143 in table 8, and that the value added effect estimate is 0.04911 from table 9.) We conclude from these comparisons, as well as from the remaining estimates in the tables, that the allocation effect is quantitatively the most important effect over sectoral value added.

#### 3.2.5 Sectoral Data and the Effects of Institutions on Development

The UNIDO dataset contains sectoral level data. However, most of the cross-country empirical or quantitative studies aiming at explaining growth disparities are carried out at the aggregate level (thus with a measure of log GDP or the growth rate of GDP as the dependent variable). Because it is possible to aggregate up from the sectoral data to the country level (in our case to the level of manufacturing), we sought to answer the question of whether the effects of institutions uncovered so far were still present under aggregation. Results are found in Table 10. There, the dependent variable is the log of the sum of sectoral value added, aggregated across the 18 subsectors of manufacturing in our data. Our complexity measure is likewise recalculated to incorporate the fact that the former separate 18 sectors are now aggregated to one. The new complexity index, computed from the US input-output matrices as before, is interacted with each country's Rule of Law indicator as was the case earlier as well.

The effects of aggregation can be gauged, for example, by comparing column (3) of Table 10 with column (3) of Table 9. While complexity interacted with the Rule of Law has no statistically significant effect once we look at aggregated data (Table 10), this variable is highly significant when sectoral data are used. Sectoral level data allow us to analyze a detailed vehicle through which institutions affect output, disproportionately so in complex sectors, a channel that is obscured when more aggregate data are used.

Further, this effect is quantitatively of a high relevance. To see this, we compute the effect of raising the quality of the Rule of Law indicator by one standard deviation for the value added in each sector: we multiply the coefficient on complexruleoflaw from column (3) of Table 9 times the complexity measure of each sector times the standard deviation of the Rule of Law indicator (approximately unity). The result gives us the growth rate of sectoral value added that would follow a one standard deviation improvement in the Rule of Law indicator. The simple average of these growth rates across the 18 subsectors of manufacturing is 31.8% for 1995, 35.8% for 2000 and 39.2% for 2005, an overall average of 36%. These are impressive magnitudes in terms of the increments of the value added of manufacturing. They would have gone completely unnoticed if aggregate data had been used exclusively!

# 4 Conclusion

In this paper, we have examined a particular channel through which institutions may affect the way in which production takes place. Specifically, and following others in the literature, we have considered the possibility that better quality in contract enforcement raises disproportionately more the productivity of sectors intensive in exchanges with other input-providing sectors. This hypothesis was first formulated in a general equilibrium context. The general equilibrium framework allowed the important insight that, though institutions may indeed disproportionately improve the productivity of complex sectors, this effect may well be temporary as factor reallocation across sectors will possibly lead to full productivity equalization. However, the underlying factor movements that follow the productivity changes generate another effect, the allocation effect, which should remain present in the data.

We explored two datasets in this empirical investigation. UNIDO covers all countries but only manufacturing subsectors. STAN covers developed economies, exclusively, but all sectors therein. We found compelling empirical evidence of both allocation and productivity effects in the UNIDO sample, at least for countries in the upper quartiles of the world productivity distribution. In the STAN dataset, we find no evidence of the productivity effect, a finding fully consistent with the outcome one would expect following shocks to sectoral productivity provided there is a high degree of input mobility.

Further, when we partition the STAN sample into STAN-only sectors (thus excluding manufacturing) and the remaining manufacturing subsectors, the allocation effect is no longer statistically significant in either case. Sample attrition is a strong candidate to explain the loss of significance but additional future research aimed at clarifying pending questions is definitely warranted.

Estimates of the allocation and productivity effects on manufacturing subsectors further show that the former is the most quantitatively relevant effect of the two, concerning their impact on sectoral value added. An additional finding is that the disproportionate impact of institutions on sectoral value added is only detected when sectoral data are used, and become statistically insignificant when data are aggregated over the 18 subsectors of manufacturing. Further, the aforementioned sectoral effects are of high quantitative relevance. This paper thus offers a new channel in the link between institutions and development and in the quest for a new theory of total factor productivity (Prescott (1997)).

The policy implications of our analysis are deep: a country's development path in terms of sectoral transformation depends crucially on the quality of its institutions. Unless the institutions of a developing country mimic those of developed economies, it will not follow a similar path of sectoral transformation.

# 5 Tables

## 5.1 Allocation Effect

Table 1A – UNIDO data
Dependent Variable is Log[Labor Share] – panel

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| VARIABLES | rule law | voice | polstab | gov effect | reg quality | contr corrpt |
| complexruleoflaw | 0.03098*** | | | | | |
| | (0.007) | | | | | |
| complexvoiceaccount | | 0.0283*** | | | | |
| | | (0.007) | | | | |
| complexpolstab | | | 0.0270*** | | | |
| | | | (0.007) | | | |
| complexgeffect | | | | 0.0318*** | | |
| | | | | (0.007) | | |
| complexregqual | | | | | 0.0335*** | |
| | | | | | (0.007) | |
| complexcontcorrupt | | | | | | 0.0234*** |
| | | | | | | (0.006) |
| Constant | -1.12694*** | -1.7150*** | -0.9267** | -1.1478*** | -1.0748** | -1.0376** |
| | (0.341) | (0.301) | (0.334) | (0.342) | (0.342) | (0.339) |
| Observations | 3,307 | 3,307 | 3,307 | 3,307 | 3,307 | 3,307 |
| Adjusted R-squared | 0.572 | 0.570 | 0.571 | 0.572 | 0.572 | 0.571 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 1B – STAN data
Dependent Variable is Log[Labor Share] – panel

| VARIABLES | (1) rule law | (2) voice | (3) polstab | (4) gov effect | (5) reg quality | (6) contr corrpt |
|---|---|---|---|---|---|---|
| complexruleoflaw | 0.02715** | | | | | |
| | (0.009) | | | | | |
| complexvoiceaccount | | 0.0392** | | | | |
| | | (0.014) | | | | |
| complexpolstab | | | 0.0137 | | | |
| | | | (0.007) | | | |
| complexgeffect | | | | 0.0278*** | | |
| | | | | (0.008) | | |
| complexregqual | | | | | 0.0211*** | |
| | | | | | (0.005) | |
| complexcontcorrupt | | | | | | 0.0208*** |
| | | | | | | (0.005) |
| Constant | -0.29526 | -0.4024 | -0.1429 | -0.4107 | -0.3663 | -0.3674 |
| | (0.267) | (0.250) | (0.199) | (0.253) | (0.249) | (0.249) |
| Observations | 2,885 | 2,885 | 2,885 | 2,885 | 2,885 | 2,885 |
| Adjusted R-squared | 0.846 | 0.845 | 0.844 | 0.846 | 0.846 | 0.846 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 2A – UNIDO data
Dependent Variable is Log[Labor Share] –
time sensitivity

| VARIABLES | (1) coincident | (2) one lead | (3) two leads |
|---|---|---|---|
| complexruleoflaw | 0.03098*** | 0.03030*** | 0.02760*** |
| | (0.007) | (0.007) | (0.007) |
| Constant | -1.12694*** | -0.41334 | -1.83663*** |
| | (0.341) | (0.347) | (0.449) |
| Observations | 3,307 | 3,416 | 3,293 |
| Adjusted R-squared | 0.572 | 0.570 | 0.552 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 2B – STAN data
Dependent Variable is Log[Labor Share] –
time sensitivity

| VARIABLES | (1) coincident | (2) one lead | (3) two leads |
|---|---|---|---|
| complexruleoflaw | 0.02715** | 0.02803** | 0.02851** |
| | (0.009) | (0.009) | (0.009) |
| Constant | -0.29526 | -1.71674*** | -0.86050** |
| | (0.267) | (0.225) | (0.270) |
| Observations | 2,885 | 2,887 | 2,815 |
| Adjusted R-squared | 0.846 | 0.848 | 0.851 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 3A – UNIDO data
Dependent Variable is Log[Labor Share]

| VARIABLES | (1) Baseline | (2) 10% Richest | (3) 10% Poorest | (4) 20% Poorest | (5) >= Median | (6) < Median | (7) Midle 50% | (8) No STAN | (9) STAN |
|---|---|---|---|---|---|---|---|---|---|
| complexruleoflaw_2 | 0.03098*** | 0.01858 | 0.04308 | 0.05751 | 0.03117*** | 0.01041 | 0.03638** | 0.02591** | 0.02806 |
| | (0.007) | (0.027) | (0.197) | (0.094) | (0.008) | (0.023) | (0.012) | (0.008) | (0.027) |
| Constant | -4.22524*** | -4.10150 | -6.70674 | -9.06115 | -4.63758*** | -3.32654 | -5.88554*** | -4.31345*** | -2.94788 |
| | (0.861) | (2.586) | (16.877) | (9.226) | (0.917) | (2.354) | (1.367) | (1.044) | (3.365) |
| Observations | 3,307 | 573 | 39 | 152 | 2,336 | 971 | 1,834 | 2,378 | 929 |
| Adjusted R-squared | 0.572 | 0.558 | 0.840 | 0.575 | 0.568 | 0.594 | 0.617 | 0.625 | 0.488 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 3B – STAN data – Dependent Variable is Log[Labor Share] – panel

| VARIABLES | (1)<br>Rule Law<br>All sectors | (2)<br>Rule Law<br>UNIDO sectors | (3)<br>Rule Law<br>STAN only sectors |
|---|---|---|---|
| complexruleoflaw_2 | 0.02715** | 0.02297 | 0.01726 |
| | (0.009) | (0.015) | (0.011) |
| Constant | -3.01014*** | -2.81408 | -3.07870* |
| | (0.791) | (1.907) | (1.229) |
| Observations | 2,885 | 1,384 | 1,501 |
| Adjusted R-squared | 0.846 | 0.721 | 0.858 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 4A – UNIDO data – Dependent Variable is Log[Labor Share] – panel

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| VARIABLES | Rule Law | Complexity | Institutions | Trade | Trade int | All int rates | All int rates |
| complexruleoflaw_2 | 0.03098*** | 0.03098*** | 0.03124*** | 0.03118*** | 0.02921*** | 0.02951* | 0.02861* |
| | (0.007) | (0.007) | (0.007) | (0.007) | (0.007) | (0.012) | (0.012) |
| complex | | 0.08770*** | 0.08757*** | 0.08754*** | 0.07455*** | 0.05732 | 0.05845 |
| | | (0.016) | (0.016) | (0.016) | (0.019) | (0.033) | (0.033) |
| ruleoflaw | | | -0.12934 | -0.17114 | -0.17883 | -0.33236 | 0.03318 |
| | | | (0.133) | (0.131) | (0.132) | (0.332) | (0.394) |
| contcorrupt | | | -0.14733* | -0.13995 | -0.13556 | -0.00122 | -0.08750 |
| | | | (0.071) | (0.072) | (0.072) | (0.247) | (0.311) |
| regqual | | | -0.04023 | -0.02481 | -0.01679 | -0.25828 | -0.58664* |
| | | | (0.075) | (0.074) | (0.075) | (0.311) | (0.247) |
| geffect | | | 0.14834 | 0.10704 | 0.10863 | 0.19984 | 0.25093 |
| | | | (0.118) | (0.122) | (0.122) | (0.257) | (0.377) |
| polstab | | | 0.13212* | 0.13048* | 0.12873* | 0.05602 | 0.07659 |
| | | | (0.053) | (0.053) | (0.053) | (0.139) | (0.160) |
| voiceaccount | | | 0.26873* | 0.28184* | 0.29567* | -0.09690 | -0.13640 |
| | | | (0.116) | (0.117) | (0.119) | (0.336) | (0.385) |
| trade | | | | 0.00164* | 0.00039 | 0.00038 | 0.00002 |
| | | | | (0.001) | (0.001) | (0.004) | (0.004) |
| complex_trade | | | | | 0.00016 | 0.00021 | 0.00020 |
| | | | | | (0.000) | (0.000) | (0.000) |
| lr | | | | | | 0.01193 | |
| | | | | | | (0.041) | |
| gb | | | | | | -0.03836 | |
| | | | | | | (0.057) | |
| tb | | | | | | 0.00811 | |
| | | | | | | (0.049) | |
| log_lr | | | | | | | 0.08673 |
| | | | | | | | (0.237) |
| log_gb | | | | | | | -0.40578 |
| | | | | | | | (0.367) |
| log_tb | | | | | | | -0.05641 |
| | | | | | | | (0.043) |
| Constant | -4.22524*** | -4.21489*** | -4.48184*** | -4.49194*** | -4.19038*** | -5.96970*** | -5.40560*** |
| | (0.861) | (0.826) | (0.828) | (0.828) | (0.812) | (1.599) | (1.518) |
| Observations | 3,307 | 3,307 | 3,307 | 3,307 | 3,307 | 968 | 968 |
| Adjusted R-squared | 0.572 | 0.572 | 0.572 | 0.572 | 0.572 | 0.610 | 0.610 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 4A – UNIDO data – Dependent Variable is Log[Labor Share] – panel

| VARIABLES | (8)<br>Int rate<br>sect interact | (9)<br>Int rate<br>sect interact w tb | (10)<br>Subset<br>Finance | (11)<br><br>Fin mkts |
|---|---|---|---|---|
| complexruleoflaw_2 | 0.01068 | 0.03334** | 0.02425* | 0.02950* |
| | (0.016) | (0.011) | (0.012) | (0.014) |
| complex | 0.10439 | 0.01573 | 0.11846*** | 0.12133*** |
| | (0.075) | (0.032) | (0.023) | (0.026) |
| ruleoflaw | 0.13554 | -0.26944 | -0.05543 | -1.35122 |
| | (0.406) | (0.204) | (0.256) | (1.057) |
| contcorrupt | 0.02782 | -0.07173 | 0.03956 | 0.66819 |
| | (0.319) | (0.104) | (0.181) | (0.955) |
| regqual | -0.56930* | -0.13501 | 0.18852 | 0.20308 |
| | (0.260) | (0.105) | (0.189) | (1.921) |
| geffect | 0.14044 | 0.02694 | 0.29593 | -0.10259 |
| | (0.382) | (0.141) | (0.258) | (0.436) |
| polstab | 0.10860 | 0.03615 | -0.06191 | -0.21160 |
| | (0.163) | (0.055) | (0.112) | (0.129) |
| voiceaccount | -0.30873 | 0.56793** | 0.43313 | 2.24809** |
| | (0.376) | (0.175) | (0.242) | (0.867) |
| trade | 0.00081 | 0.00059 | 0.00338 | 0.00390 |
| | (0.004) | (0.001) | (0.003) | (0.003) |
| complex_trade | 0.00013 | 0.00030* | 0.00022 | 0.00030 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| bank | | | 0.00272 | |
| | | | (0.002) | |
| stkmarkt | | | 0.00045 | 0.00751 |
| | | | (0.001) | (0.007) |
| stkmktturn | | | 0.00003 | -0.00042 |
| | | | (0.001) | (0.002) |
| volstocks | | | -0.01269* | -0.00897 |
| | | | (0.006) | (0.032) |
| mktcap | | | | -0.01155 |
| | | | | (0.011) |
| complex_volstocks | | | | |
| Constant | -1.49460 | -5.91876*** | -10.13511*** | -8.86119** |
| | (1.780) | (1.206) | (2.086) | (3.169) |
| Observations | 968 | 1,807 | 930 | 536 |
| Adjusted R-squared | 0.631 | 0.591 | 0.611 | 0.569 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 4A – UNIDO data – Dependent Variable is Log[Labor Share] – panel

| VARIABLES | (12)<br>Subset Fin mkts | (13)<br>Only volstocsk | (14)<br>Volst int | (15)<br>No Trade<br>no int | (16)<br>No Trade<br>no int<br>>= Median |
|---|---|---|---|---|---|
| complexruleoflaw_2 | 0.02471* | 0.02791* | 0.02813* | 0.02955** | 0.02997** |
| | (0.012) | (0.011) | (0.013) | (0.011) | (0.010) |
| complex | 0.11831*** | -0.06791* | -0.06860 | -0.04405 | -0.03856 |
| | (0.024) | (0.033) | (0.041) | (0.030) | (0.032) |
| ruleoflaw | -0.19071 | -0.24324 | -0.24505 | -0.06609 | -0.11510 |
| | (0.221) | (0.216) | (0.222) | (0.235) | (0.223) |
| contcorrupt | -0.00085 | 0.17567 | 0.17574 | 0.18031 | 0.19905 |
| | (0.199) | (0.125) | (0.125) | (0.126) | (0.126) |
| regqual | 0.23788 | -0.05342 | -0.05350 | -0.13628 | -0.12779 |
| | (0.206) | (0.153) | (0.153) | (0.157) | (0.161) |
| geffect | 0.21917 | 0.14220 | 0.14248 | 0.19017 | 0.09647 |
| | (0.240) | (0.179) | (0.179) | (0.186) | (0.192) |
| polstab | -0.04334 | 0.02921 | 0.02919 | 0.03044 | 0.08073 |
| | (0.106) | (0.052) | (0.052) | (0.052) | (0.050) |
| voiceaccount | 0.41947 | 0.27373 | 0.27357 | 0.13664 | 0.35089 |
| | (0.240) | (0.211) | (0.211) | (0.188) | (0.198) |
| trade | 0.00340 | 0.00058 | 0.00058 | | |
| | (0.003) | (0.002) | (0.002) | | |
| complex_trade | 0.00022 | 0.00027 | 0.00027 | | |
| | (0.000) | (0.000) | (0.000) | | |
| bank | | | | | |
| | | | | | |
| stkmarkt | 0.00043 | | | | |
| | (0.001) | | | | |
| stkmktturn | 0.00030 | | | | |
| | (0.000) | | | | |
| volstocks | -0.01279* | -0.00710* | -0.00725 | -0.00742* | -0.00898** |
| | (0.006) | (0.003) | (0.006) | (0.003) | (0.003) |
| mktcap | | | | | |
| | | | | | |
| complex_volstocks | | | 0.00002 | | |
| | | | (0.001) | | |
| Constant | -9.59123*** | -3.02166** | -3.04075* | -2.99696** | -3.20720** |
| | (1.962) | (1.110) | (1.364) | (1.110) | (1.112) |
| | | | | | |
| Observations | 930 | 1,300 | 1,300 | 1,300 | 1,139 |
| Adjusted R-squared | 0.611 | 0.610 | 0.610 | 0.607 | 0.618 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

TAble 4B – STAN data – Dependent Variable is Log[Labor Share] – panel

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| VARIABLES | Rule Law | Complexity | Institutions | Trade | Trade int | All int rates | All int rates |
| complexruleoflaw_2 | 0.02715** | 0.02715** | 0.02715** | 0.02715** | 0.02763** | 0.02342* | 0.02342* |
| | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.011) | (0.011) |
| complex | | 0.11643*** | 0.11643*** | 0.11643*** | 0.12754*** | 0.17215*** | 0.17215*** |
| | | (0.016) | (0.016) | (0.016) | (0.019) | (0.021) | (0.021) |
| regqual | | | -0.06715 | -0.06794 | -0.07020 | -0.18633 | 0.08212 |
| | | | (0.114) | (0.091) | (0.091) | (0.143) | (0.098) |
| polstab | | | 0.04275 | 0.03230 | 0.03131 | 0.12455* | 0.10540 |
| | | | (0.054) | (0.056) | (0.057) | (0.053) | (0.073) |
| trade | | | | -0.00106 | 0.00021 | -0.00106 | -0.00039 |
| | | | | (0.001) | (0.001) | (0.001) | (0.001) |
| complex_trade | | | | | -0.00015 | -0.00009 | -0.00009 |
| | | | | | (0.000) | (0.000) | (0.000) |
| lr | | | | | | 0.01263 | |
| | | | | | | (0.012) | |
| gb | | | | | | -0.01816 | |
| | | | | | | (0.015) | |
| tb | | | | | | 0.02733 | |
| | | | | | | (0.031) | |
| ruleoflaw | | | -0.11571 | -0.09866 | -0.09940 | | -0.38361 |
| | | | (0.221) | (0.200) | (0.199) | | (0.212) |
| log_lr | | | | | | | 0.13170 |
| | | | | | | | (0.122) |
| log_gb | | | | | | | -0.24168 |
| | | | | | | | (0.169) |
| log_tb | | | | | | | 0.01893 |
| | | | | | | | (0.133) |
| Constant | -3.01014*** | -3.68284*** | -3.67624*** | -3.63536*** | -3.77278*** | -5.39353*** | -5.11131*** |
| | (0.791) | (0.716) | (0.740) | (0.745) | (0.729) | (1.021) | (0.944) |
| Observations | 2,885 | 2,885 | 2,885 | 2,885 | 2,885 | 2,120 | 2,120 |
| Adjusted R-squared | 0.846 | 0.846 | 0.846 | 0.846 | 0.846 | 0.846 | 0.846 |

Robust standard errors in parentheses

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

Table 4B – STAN data – Dependent Variable is Log[Labor Share] – panel

| VARIABLES | (8)<br>Int rate<br>sect interact | (9)<br>Subset Finance | (10)<br>Fin mkts | (11)<br>Subset Fin mkts |
|---|---|---|---|---|
| complexruleoflaw_2 | 0.02525** | 0.02180* | 0.01864 | 0.02180* |
| | (0.009) | (0.009) | (0.012) | (0.009) |
| complex | 0.28713*** | 0.28469*** | 0.20528*** | 0.28469*** |
| | (0.054) | (0.049) | (0.040) | (0.049) |
| regqual | 0.61903* | 0.25830 | -0.26654 | -0.06663 |
| | (0.269) | (0.406) | (0.147) | (0.145) |
| polstab | -0.18527 | 0.31636 | -0.11409 | 0.40031 |
| | (0.112) | (0.206) | (0.104) | (0.314) |
| trade | -0.00488 | -0.00499 | 0.00378 | -0.00696 |
| | (0.003) | (0.005) | (0.002) | (0.007) |
| complex_trade | -0.00010 | -0.00005 | -0.00013 | -0.00005 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| ruleoflaw | | | | |
| bank | | 0.00529 | | |
| | | (0.005) | | |
| stkmarkt | | -0.00313 | -0.00087 | -0.00013 |
| | | (0.003) | (0.001) | (0.000) |
| stkmktturn | | 0.00087 | 0.00087 | 0.00075 |
| | | (0.002) | (0.001) | (0.001) |
| volstocks | | -0.00296 | -0.00430 | -0.02505 |
| | | (0.008) | (0.009) | (0.027) |
| mktcap | | | -0.00318 | |
| | | | (0.004) | |
| complex_volstocks | | | | |
| Constant | -6.84038*** | -4.66660** | -4.11039** | -3.07925** |
| | (0.884) | (1.688) | (1.512) | (1.037) |
| Observations | 2,120 | 1,723 | 806 | 1,723 |
| Adjusted R-squared | 0.865 | 0.876 | 0.857 | 0.876 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 4B – STAN data – Dependent Variable is Log[Labor Share] – panel

| | (12) | (13) | (14) |
|---|---|---|---|
| VARIABLES | Only volstocks | Volst int | No Trade, no fin no int |
| complexruleoflaw_2 | 0.02254* | 0.02000* | 0.02513** |
| | (0.009) | (0.009) | (0.009) |
| complex | 0.29381*** | 0.30251*** | 0.28321*** |
| | (0.055) | (0.054) | (0.053) |
| regqual | -0.26685 | -0.25330 | 0.45470 |
| | (0.249) | (0.251) | (0.237) |
| polstab | 0.39679 | 0.39537 | 0.15001 |
| | (0.358) | (0.360) | (0.116) |
| trade | -0.00863 | -0.00810 | |
| | (0.009) | (0.009) | |
| complex_trade | -0.00008 | -0.00009 | |
| | (0.000) | (0.000) | |
| ruleoflaw | | | |
| volstocks | -0.02349 | -0.01408 | |
| | (0.022) | (0.023) | |
| mktcap | | | |
| complex_volstocks | | -0.00094 | |
| | | (0.001) | |
| Constant | -7.04048*** | -6.82700*** | -6.58983*** |
| | (1.401) | (1.403) | (0.872) |
| Observations | 1,890 | 1,890 | 2,120 |
| Adjusted R-squared | 0.866 | 0.866 | 0.865 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

## 5.2 Productivity Effect

Tabe 5A – UNIDO data

Dependent Variable is Log[Productivity_PPP] – panel

| VARIABLES | (1)<br>rule law | (2)<br>voice | (3)<br>polstab | (4)<br>gov effect | (5)<br>reg quality | (6)<br>contr corrpt |
|---|---|---|---|---|---|---|
| complexruleoflaw | 0.01297** | | | | | |
| | (0.004) | | | | | |
| complexvoiceaccount | | 0.0156*** | | | | |
| | | (0.004) | | | | |
| complexpolstab | | | 0.0112** | | | |
| | | | (0.004) | | | |
| complexgeffect | | | | 0.0147*** | | |
| | | | | (0.004) | | |
| complexregqual | | | | | 0.0163*** | |
| | | | | | (0.004) | |
| complexcontcorrupt | | | | | | 0.0113** |
| | | | | | | (0.003) |
| Constant | 9.97608*** | 9.8945*** | 9.8554*** | 10.0227*** | 9.9720*** | 9.9646*** |
| | (0.352) | (0.348) | (0.349) | (0.353) | (0.350) | (0.351) |
| Observations | 3,490 | 3,490 | 3,490 | 3,490 | 3,490 | 3,490 |
| Adjusted R-squared | 0.699 | 0.699 | 0.699 | 0.699 | 0.699 | 0.699 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 5B –STAN data
Dependent Variable is Log[Productivity] – panel

| VARIABLES | (1)<br>rule law | (2)<br>voice | (3)<br>polstab | (4)<br>gov effect | (5)<br>reg quality | (6)<br>contr corrpt |
|---|---|---|---|---|---|---|
| complexruleoflaw | -0.00758 | | | | | |
| | (0.006) | | | | | |
| complexvoiceaccount | | -0.0083 | | | | |
| | | (0.010) | | | | |
| complexpolstab | | | -0.0052 | | | |
| | | | (0.006) | | | |
| complexgeffect | | | | -0.0098 | | |
| | | | | (0.006) | | |
| complexregqual | | | | | -0.0052 | |
| | | | | | (0.004) | |
| complexcontcorrupt | | | | | | -0.0055 |
| | | | | | | (0.004) |
| Constant | 9.88929*** | 10.6022*** | 10.1861*** | 10.3957*** | 10.2969*** | 10.2991*** |
| | (0.324) | (0.210) | (0.204) | (0.214) | (0.200) | (0.200) |
| Observations | 2,543 | 2,543 | 2,543 | 2,543 | 2,543 | 2,543 |
| Adjusted R-squared | 0.854 | 0.854 | 0.854 | 0.854 | 0.854 | 0.854 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 6 – UNIDO data
Dependent Variable is Log[Productivity_PPP] –
time sensitivity

| VARIABLES | (1)<br>coincident | (2)<br>one lead | (3)<br>two leads |
|---|---|---|---|
| complexruleoflaw | 0.01297** | 0.01577*** | 0.00898* |
| | (0.004) | (0.004) | (0.004) |
| Constant | 9.97608*** | 10.31134*** | 10.63590*** |
| | (0.352) | (0.855) | (0.904) |
| Observations | 3,490 | 3,606 | 3,260 |
| Adjusted R-squared | 0.699 | 0.704 | 0.765 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 7 – UNIDO data – panel

Dependent Variable is Log[Productivity_PPP]

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Baseline | 10% Richest | 10% Poorest | 20% Poorest |
| complexruleoflaw_2 | 0.01297** | 0.02005 | 0.07726 | 0.06708 |
| | (0.004) | (0.016) | (0.060) | (0.038) |
| Constant | 8.67888*** | 8.05878*** | 0.27340 | 2.78801 |
| | (0.504) | (1.960) | (6.175) | (3.797) |
| Observations | 3,490 | 583 | 203 | 340 |
| Adjusted R-squared | 0.699 | 0.626 | 0.503 | 0.516 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 7 (cont.) – UNIDO data – panel

Dependent Variable is Log[Productivity_PPP]

| | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|
| VARIABLES | >= Median | < Median | Midle 50% | No STAN | STAN |
| complexruleoflaw_2 | 0.01543** | 0.01427 | 0.02146* | 0.01517** | 0.01180 |
| | (0.005) | (0.012) | (0.009) | (0.006) | (0.011) |
| Constant | 8.31350*** | 8.20488*** | 8.48828*** | 8.05329*** | 11.29857*** |
| | (1.133) | (1.335) | (0.884) | (0.848) | (1.139) |
| Observations | 2,251 | 1,239 | 1,769 | 2,552 | 938 |
| Adjusted R-squared | 0.677 | 0.619 | 0.647 | 0.671 | 0.620 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 8 – UNIDO data

Dependent Variable is Log[Productivity] – panel

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Rule Law | Complexity | Institutions | Trade | Trade int |
| complexruleoflaw_2 | 0.01297** | 0.01297** | 0.01425** | 0.01414** | 0.01367** |
| | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |
| complex | | -0.11270*** | -0.11394*** | -0.11397*** | -0.11616*** |
| | | (0.013) | (0.013) | (0.013) | (0.013) |
| ruleoflaw | | | -0.20509* | -0.27035** | -0.26969** |
| | | | (0.102) | (0.100) | (0.100) |
| contcorrupt | | | 0.02296 | 0.02626 | 0.02673 |
| | | | (0.054) | (0.053) | (0.053) |
| regqual | | | 0.16124** | 0.16743** | 0.16825** |
| | | | (0.058) | (0.058) | (0.058) |
| geffect | | | 0.37071*** | 0.34048*** | 0.34086*** |
| | | | (0.088) | (0.089) | (0.089) |
| polstab | | | -0.19770*** | -0.19667*** | -0.19714*** |
| | | | (0.042) | (0.042) | (0.042) |
| voiceaccount | | | -0.02833 | -0.00092 | 0.00098 |
| | | | (0.100) | (0.099) | (0.099) |
| trade | | | | 0.00236** | 0.00215* |
| | | | | (0.001) | (0.001) |
| complex_trade | | | | | 0.00003 |
| | | | | | (0.000) |
| Constant | 8.67888*** | 9.64064*** | 10.42762*** | 9.05961*** | 9.12310*** |
| | (0.504) | (0.512) | (0.505) | (0.783) | (0.791) |
| Observations | 3,490 | 3,490 | 3,490 | 3,490 | 3,490 |
| Adjusted R-squared | 0.699 | 0.699 | 0.701 | 0.702 | 0.702 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 8 (cont.) – UNIDO data

Dependent Variable is Log[Productivity] – panel

| | (6) | (7) | (8) | (9) | (10) | (11) |
|---|---|---|---|---|---|---|
| ARIABLES | All int rates | Only tb | Only tb no trade int | All int rates | Only log_lr | Only log_lr no trade int |
| lexruleoflaw_2 | 0.02158* | 0.01392* | 0.01398* | 0.02121* | 0.01252* | 0.01324** |
| | (0.010) | (0.006) | (0.006) | (0.010) | (0.005) | (0.005) |
| complex | -0.10861*** | -0.10770*** | -0.10735*** | -0.10847*** | -0.11097*** | -0.10756*** |
| | (0.025) | (0.018) | (0.017) | (0.025) | (0.015) | (0.014) |
| ruleoflaw | 0.05285 | -0.35690** | -0.35694** | -0.12656 | -0.17318 | -0.17450 |
| | (0.192) | (0.133) | (0.133) | (0.198) | (0.114) | (0.115) |
| ontcorrupt | 0.15633 | -0.01648 | -0.01650 | 0.42010*** | -0.01109 | -0.01144 |
| | (0.132) | (0.071) | (0.071) | (0.126) | (0.060) | (0.060) |
| regqual | 0.41848** | 0.29475** | 0.29436** | 0.24844* | 0.19714** | 0.19553** |
| | (0.139) | (0.093) | (0.092) | (0.125) | (0.071) | (0.070) |
| geffect | 0.11708 | 0.08993 | 0.08987 | 0.00064 | 0.28370* | 0.28363* |
| | (0.166) | (0.124) | (0.124) | (0.164) | (0.114) | (0.114) |
| polstab | -0.31225*** | -0.14772** | -0.14751** | -0.14504 | -0.17248*** | -0.17150*** |
| | (0.077) | (0.050) | (0.050) | (0.074) | (0.047) | (0.046) |
| oiceaccount | -0.42964 | 0.09226 | 0.09167 | -0.04873 | 0.07600 | 0.07301 |
| | (0.243) | (0.163) | (0.162) | (0.229) | (0.111) | (0.111) |
| trade | 0.00281 | 0.00393** | 0.00396*** | 0.00439 | 0.00165 | 0.00196* |
| | (0.002) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) |
| mplex_trade | -0.00014 | 0.00000 | | -0.00014 | 0.00004 | |
| | (0.000) | (0.000) | | (0.000) | (0.000) | |
| lr | -0.00285 | | | | | |
| | (0.023) | | | | | |
| gb | -0.05955 | | | | | |
| | (0.034) | | | | | |
| tb | 0.05751* | -0.00634* | -0.00634* | | | |
| | (0.025) | (0.003) | (0.003) | | | |
| log_lr | | | | -0.23776* | -0.18081*** | -0.17994*** |
| | | | | (0.121) | (0.033) | (0.032) |
| log_gb | | | | 0.26937 | | |
| | | | | (0.179) | | |
| log_tb | | | | 0.04331 | | |
| | | | | (0.025) | | |
| Constant | 9.59225*** | 10.38491*** | 10.37470*** | 9.94433*** | 11.40289*** | 11.30252*** |
| | (0.901) | (0.816) | (0.816) | (0.882) | (0.612) | (0.602) |
| bservations | 957 | 1,864 | 1,864 | 957 | 3,006 | 3,006 |
| sted R-squared | 0.740 | 0.709 | 0.710 | 0.739 | 0.704 | 0.704 |

Robust standard errors in parentheses

*** $p<0.001$, ** $p<0.01$, * $p<0.05$

Table 8 (cont.) – UNIDO data
Dependent Variable is Log[Productivity] – panel

| VARIABLES | (12)<br>All int rates<br>sect interact | (13)<br>Int rate<br>sect interact w tb | (14)<br>Int rate<br>sect interact w tb<br>no trade int |
|---|---|---|---|
| complexruleoflaw_2 | 0.02325* | 0.01426* | 0.01429* |
| | (0.012) | (0.007) | (0.007) |
| complex | -0.05134 | -0.14819*** | -0.14798*** |
| | (0.047) | (0.017) | (0.017) |
| ruleoflaw | -0.15546 | -0.44619** | -0.44620** |
| | (0.208) | (0.155) | (0.155) |
| contcorrupt | 0.42491** | 0.03033 | 0.03034 |
| | (0.132) | (0.079) | (0.079) |
| regqual | 0.25133 | 0.21974* | 0.21965* |
| | (0.133) | (0.098) | (0.098) |
| geffect | 0.00087 | 0.08105 | 0.08107 |
| | (0.174) | (0.134) | (0.134) |
| polstab | -0.14142 | -0.09657 | -0.09648 |
| | (0.078) | (0.053) | (0.052) |
| voiceaccount | -0.04075 | 0.19831 | 0.19791 |
| | (0.230) | (0.169) | (0.168) |
| trade | 0.00465* | 0.00411** | 0.00413*** |
| | (0.002) | (0.001) | (0.001) |
| complex_trade | -0.00015* | 0.00000 | |
| | (0.000) | (0.000) | |
| Constant | 8.28262*** | 11.43745*** | 11.43232*** |
| | (1.125) | (0.878) | (0.891) |
| Observations | 957 | 1,864 | 1,864 |
| Adjusted R-squared | 0.747 | 0.709 | 0.709 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 8 (cont.) – UNIDO data

Table 8 (cont.) – Dependent Variable is Log[Productivity] – panel

| | (15) | (16) | (17) |
|---|---|---|---|
| VARIABLES | Finance | Subset Finance | Fin mkts |
| complexruleoflaw_2 | -0.00748 | 0.01592* | 0.01815 |
| | (0.044) | (0.008) | (0.012) |
| complex | -0.31798*** | -0.11908*** | -0.14709*** |
| | (0.064) | (0.019) | (0.022) |
| ruleoflaw | | -0.08893 | -0.01715 |
| | | (0.147) | (0.289) |
| contcorrupt | | 0.08875 | 1.28871** |
| | | (0.123) | (0.398) |
| regqual | | -0.03183 | 0.21566 |
| | | (0.108) | (0.518) |
| geffect | | 0.13329 | -2.35135 |
| | | (0.226) | (1.373) |
| polstab | | 0.09948 | 0.80378 |
| | | (0.078) | (0.462) |
| voiceaccount | | -0.59761*** | -0.29618 |
| | | (0.160) | (0.620) |
| trade | 0.00358 | -0.00034 | -0.00110 |
| | (0.006) | (0.001) | (0.002) |
| log_lr | | -0.19062*** | -0.00136 |
| | | (0.054) | (0.133) |
| bankacc | 0.00119 | | |
| | (0.002) | | |
| mktcap | -0.01318 | | -0.00156 |
| | (0.009) | | (0.013) |
| stkmktturn | 0.00205 | -0.00082*** | -0.00313 |
| | (0.007) | (0.000) | (0.002) |
| bank | | 0.00027 | |
| | | (0.000) | |
| stkmarkt | | -0.00070 | -0.00955 |
| | | (0.000) | (0.005) |
| volstocks | | 0.01805*** | 0.05685* |
| | | (0.004) | (0.028) |
| Constant | 15.23434** | 8.72067*** | 14.80924*** |
| | (4.645) | (0.789) | (2.030) |
| Observations | 85 | 1,312 | 742 |
| Adjusted R-squared | 0.679 | 0.704 | 0.644 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 8 (cont.) – UNIDO data
Dependent Variable is Log[Productivity] – panel

| | (18) | (19) | (20) |
|---|---|---|---|
| VARIABLES | Subset Fin mkts | Subset Fin mkts no stkmarkt | No fin no trade no int |
| complexruleoflaw_2 | 0.01594* | 0.01563* | 0.01331** |
| | (0.008) | (0.007) | (0.005) |
| complex | -0.11907*** | -0.10252*** | -0.10755*** |
| | (0.019) | (0.017) | (0.014) |
| ruleoflaw | -0.08403 | -0.00458 | -0.12678 |
| | (0.147) | (0.138) | (0.119) |
| contcorrupt | 0.07973 | 0.00668 | -0.01509 |
| | (0.126) | (0.110) | (0.060) |
| regqual | -0.04590 | 0.25759** | 0.16982* |
| | (0.102) | (0.079) | (0.070) |
| geffect | 0.13774 | 0.16840 | 0.34461** |
| | (0.227) | (0.163) | (0.106) |
| polstab | 0.09645 | -0.19690*** | -0.17297*** |
| | (0.078) | (0.054) | (0.046) |
| voiceaccount | -0.60467*** | -0.12698 | 0.03848 |
| | (0.158) | (0.115) | (0.114) |
| trade | -0.00039 | 0.00147 | |
| | (0.001) | (0.001) | |
| log_lr | -0.19780*** | -0.13874* | -0.18831*** |
| | (0.052) | (0.056) | (0.033) |
| bankacc | | | |
| mktcap | | | |
| stkmktturn | -0.00081*** | -0.00030 | |
| | (0.000) | (0.000) | |
| bank | | | |
| stkmarkt | -0.00067 | | |
| | (0.000) | | |
| volstocks | 0.01810*** | -0.00022 | |
| | (0.004) | (0.003) | |
| Constant | 8.74496*** | 9.72971*** | 11.36980*** |
| | (0.794) | (0.838) | (0.604) |
| Observations | 1,312 | 1,811 | 3,006 |
| Adjusted R-squared | 0.704 | 0.707 | 0.704 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

## 5.3 Value Added

Table 9 – UNIDO data – Dependent Variable is Log[Productivity] + Log[Labor Share] – panel

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| VARIABLES | Rule Law | Complexity | Institutions | Trade | Trade int | All int rates | All int rates |
| complexruleoflaw_2 | 0.04954*** | 0.04954*** | 0.04911*** | 0.04904*** | 0.04609*** | 0.04681** | 0.04574** |
| | (0.009) | (0.009) | (0.010) | (0.010) | (0.010) | (0.016) | (0.016) |
| complex | | -0.02145 | -0.02166 | -0.02207 | -0.03662 | -0.06626 | -0.06507 |
| | | (0.024) | (0.024) | (0.024) | (0.027) | (0.045) | (0.045) |
| ruleoflaw | | | -0.15092 | -0.28647 | -0.28955 | -0.06261 | 0.62631 |
| | | | (0.152) | (0.156) | (0.157) | (0.365) | (0.443) |
| contcorrupt | | | -0.13560 | -0.12943 | -0.12292 | 0.00093 | -0.20929 |
| | | | (0.088) | (0.088) | (0.088) | (0.253) | (0.327) |
| regqual | | | 0.16025 | 0.20413* | 0.21140* | 0.22181 | -0.20541 |
| | | | (0.097) | (0.096) | (0.097) | (0.325) | (0.263) |
| geffect | | | 0.49009*** | 0.38995** | 0.39440** | 0.33733 | 0.57779 |
| | | | (0.145) | (0.150) | (0.150) | (0.302) | (0.403) |
| polstab | | | -0.03166 | -0.03901 | -0.04323 | -0.28857 | -0.35822* |
| | | | (0.071) | (0.071) | (0.071) | (0.163) | (0.159) |
| voiceaccount | | | -0.04692 | -0.00891 | 0.00988 | -0.17470 | -0.31639 |
| | | | (0.154) | (0.155) | (0.157) | (0.343) | (0.424) |
| trade | | | | 0.00428*** | 0.00282 | 0.00706 | 0.00406 |
| | | | | (0.001) | (0.002) | (0.005) | (0.004) |
| complex_trade | | | | | 0.00018 | 0.00005 | 0.00005 |
| | | | | | (0.000) | (0.000) | (0.000) |
| lr | | | | | | 0.00604 | |
| | | | | | | (0.048) | |
| gb | | | | | | -0.07073 | |
| | | | | | | (0.055) | |
| tb | | | | | | 0.04463 | |
| | | | | | | (0.049) | |
| log_lr | | | | | | | 0.24179 |
| | | | | | | | (0.265) |
| log_gb | | | | | | | -0.80468 |
| | | | | | | | (0.417) |
| log_tb | | | | | | | -0.08704 |
| | | | | | | | (0.052) |
| Constant | 4.99314*** | 5.34653*** | 5.45295*** | 5.05619*** | 5.46400*** | 2.60946 | 4.43997* |
| | (1.380) | (1.366) | (1.038) | (1.391) | (1.376) | (2.083) | (2.010) |
| Observations | 2,854 | 2,854 | 2,854 | 2,854 | 2,854 | 894 | 894 |
| Adjusted R-squared | 0.603 | 0.603 | 0.604 | 0.604 | 0.604 | 0.511 | 0.510 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 9 – UNIDO data – Dependent Variable is Log[Productivity] + Log[Labor Share] – panel

| VARIABLES | (8)<br>Int rate<br>sect interact | (9)<br>Int rate<br>sect interact w tb | (10)<br>Subset Finance | (11)<br>Fin mkts | (12)<br>Subset Fin mkts |
|---|---|---|---|---|---|
| complexruleoflaw_2 | 0.02787 | 0.04629*** | 0.04812** | 0.05715** | 0.04854** |
| | (0.021) | (0.013) | (0.016) | (0.021) | (0.016) |
| complex | -0.01302 | -0.11211** | -0.07251 | -0.08556* | -0.07250 |
| | (0.106) | (0.035) | (0.038) | (0.043) | (0.038) |
| ruleoflaw | 0.71088 | -0.38857 | -0.04427 | -3.22776*** | -0.15995 |
| | (0.470) | (0.228) | (0.279) | (0.940) | (0.261) |
| contcorrupt | -0.09263 | -0.18854 | 0.09604 | 1.85401* | 0.05965 |
| | (0.345) | (0.116) | (0.195) | (0.747) | (0.207) |
| regqual | -0.16168 | 0.54304*** | 0.35985 | -4.52211* | 0.40590 |
| | (0.272) | (0.150) | (0.223) | (2.130) | (0.242) |
| geffect | 0.46517 | -0.17807 | 0.00247 | 0.43272 | -0.06804 |
| | (0.434) | (0.184) | (0.256) | (0.446) | (0.252) |
| polstab | -0.32749 | -0.07775 | -0.11489 | -0.79063*** | -0.09740 |
| | (0.169) | (0.068) | (0.113) | (0.159) | (0.108) |
| voiceaccount | -0.45808 | 0.40676 | 0.25747 | 2.33424** | 0.24874 |
| | (0.415) | (0.228) | (0.275) | (0.718) | (0.273) |
| trade | 0.00499 | 0.00638** | 0.00388 | 0.00502 | 0.00391 |
| | (0.005) | (0.002) | (0.003) | (0.003) | (0.003) |
| complex_trade | -0.00001 | 0.00028 | 0.00018 | 0.00026 | 0.00017 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| bank | | | 0.00232 | | |
| | | | (0.002) | | |
| stkmarkt | | | 0.00007 | 0.02893*** | 0.00005 |
| | | | (0.001) | (0.008) | (0.001) |
| stkmktturn | | | -0.00008 | 0.00557** | 0.00014 |
| | | | (0.001) | (0.002) | (0.001) |
| volstocks | | | -0.00688 | -0.11423** | -0.00688 |
| | | | (0.006) | (0.038) | (0.006) |
| mktcap | | | | -0.04003*** | |
| | | | | (0.011) | |
| complex_volstocks | | | | | |
| Constant | 4.75381 | 4.88969*** | 6.89564*** | 7.73814* | 3.76410 |
| | (2.619) | (1.457) | (1.600) | (3.580) | (2.172) |
| Observations | 894 | 1,585 | 891 | 533 | 891 |
| Adjusted R-squared | 0.534 | 0.595 | 0.457 | 0.388 | 0.457 |

Robust standard errors in parentheses

*** p<0.001, ** p<0.01, * p<0.05

Table 9 – UNIDO data – Dependent Variable is Log[Productivity] + Log[Labor Share] – panel

| | (13) | (14) | (15) | (16) | (17) |
|---|---|---|---|---|---|
| VARIABLES | Only volstocsk | Volst int | No Trade no int | No Trade no fin no int | No Trade no f no int >= Median |
| complexruleoflaw_2 | 0.04523** | 0.05659** | 0.04793** | 0.04950*** | 0.05104** |
| | (0.016) | (0.020) | (0.016) | (0.014) | (0.016) |
| complex | -0.12561** | -0.16217* | -0.10640** | -0.08576** | -0.00566 |
| | (0.043) | (0.067) | (0.039) | (0.031) | (0.028) |
| ruleoflaw | -0.23528 | -0.32792 | 0.10753 | 0.03416 | -0.08583 |
| | (0.256) | (0.270) | (0.257) | (0.222) | (0.242) |
| contcorrupt | -0.12800 | -0.12379 | -0.08236 | -0.10729 | -0.08154 |
| | (0.160) | (0.160) | (0.163) | (0.116) | (0.129) |
| regqual | 0.57882** | 0.57128** | 0.34996 | 0.34306* | 0.29323 |
| | (0.212) | (0.211) | (0.206) | (0.151) | (0.152) |
| geffect | -0.44637 | -0.43235 | -0.34060 | 0.23393 | 0.20592 |
| | (0.240) | (0.239) | (0.246) | (0.176) | (0.190) |
| polstab | -0.06366 | -0.06353 | -0.06098 | -0.13926* | -0.10684 |
| | (0.075) | (0.075) | (0.076) | (0.068) | (0.065) |
| voiceaccount | 0.16314 | 0.15430 | -0.05164 | 0.26043 | 0.46016 |
| | (0.261) | (0.260) | (0.234) | (0.224) | (0.243) |
| trade | 0.00480 | 0.00480 | | | |
| | (0.003) | (0.003) | | | |
| complex_trade | 0.00025 | 0.00024 | | | |
| | (0.000) | (0.000) | | | |
| volstocks | -0.00543 | -0.01289 | -0.00567 | | |
| | (0.004) | (0.012) | (0.004) | | |
| mktcap | | | | | |
| complex_volstocks | | 0.00108 | | | |
| | | (0.002) | | | |
| Constant | 5.43391** | 4.55696* | 4.52005** | 4.92905*** | 4.34655** |
| | (1.866) | (2.008) | (1.527) | (1.470) | (1.570) |
| Observations | 1,185 | 1,185 | 1,185 | 1,585 | 1,309 |
| Adjusted R-squared | 0.524 | 0.525 | 0.520 | 0.590 | 0.461 |

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

## 5.4 Aggregation

Table 10 – UNIDO aggregated data
Dependent Variable is Log[Vadded Manufacturing] – panel

| VARIABLES | (1) Rule of Law | (2) Complexity | (3) Institutions |
|---|---|---|---|
| complexruleoflaw | 0.01946 | 0.01946 | -0.12172 |
| | (0.051) | (0.051) | (0.096) |
| complexsq_totmanuf | | 0.04020** | 0.04610** |
| | | (0.013) | (0.016) |
| ruleoflaw | | | 0.48711 |
| | | | (0.471) |
| contcorrupt | | | -0.12842 |
| | | | (0.173) |
| regqual | | | 0.38813 |
| | | | (0.205) |
| geffect | | | 0.56504* |
| | | | (0.255) |
| polstab | | | -0.25535 |
| | | | (0.145) |
| voiceaccount | | | -0.18316 |
| | | | (0.256) |
| Constant | 15.70848*** | 15.41485*** | 17.83413*** |
| | (0.408) | (0.452) | (0.511) |
| Observations | 189 | 189 | 189 |
| Adjusted R-squared | 0.938 | 0.938 | 0.945 |

Standard errors in parentheses
*** $p<0.001$, ** $p<0.01$, * $p<0.05$

# References


[1] Acemoglu, Daron, Simon Jonhson and James Robinson (2001) "The Colonial Origins of Comparative Development: An Empirical Investigation" *American Economic Review* 91, 1369-1401.

[2] Acemoglu, Daron and James Robinson (2012) *Why Nations Fail: The Origins of Power, Prosperity, and Poverty.* Crown Publishers, New York, NY.

[3] Acemoglu, Daron, Pol Antràs and Elhanan Helman (2007) "Contracts and Technology Adoption" *American Economic Review* 97, 916-943.

[4] Blanchard, Olivier and Michael Kremer (1997) "Disorganization" *Quarterly Journal of Economics* 112, 1091-1126.

[5] Caselli, Francesco (2005) "Accounting for Cross-Country Income Differences" in *Handbook of Economic Growth* 1A, Philippe Aghion and Steven N. Durlauf (eds), Elsevier, Amsterdam, The Netherlands.

[6] Čihák, Martin, Aslı Demirgüç-Kunt, Erik Feyen, and Ross Levine (2012) "Benchmarking Financial Systems Around the World" *World Bank Policy Research Working Paper* 6175, World Bank, Washington, D.C.

[7] Costinot, Arnaud (2009) "On the origins of comparative advantage" *Journal of International Economics* 77, 255-264.

[8] Cowan, Kevin and Alejandro Neut (2007) "Intermediate Goods, Institutions and Output per Worker" WP 420, Central Bank of Chile.

[9] *Global Financial Development Database* (GFDD), The World Bank (accessed April 16, 2013).

[10] Hall, Robert E. and Charlies I. Jones (1999) Why do some countries produce so much more output per worker than others? *Quarterly Journal of Economics* 114, 83-116.

[11] Herrendorf, Berthold and Ákos Valentinyi (2012) “Which Sectors Make Countries So Unproductive?” *Journal of the European Economic Association* 10, 323-341.

[12] Hsieh, Chang-Tai and Peter J. Klenow (2009) “Misallocation and Manufactured GDP in China and India” *Quarterly Journal of Economics* 124, 1403-1448.

[13] *International Financial Statistics (2012)*. Country Tables, Interest rates, Government Securities, Treasury Bills; Interest Rates, Lending Rate; Interest rates, Government Securities, Government Bonds, June 2012 [Data File]. Washington, D.C.: International Monetary Fund (accessed June 15, 2012).

[14] Knack, Stephen and Philip Keefer (1995) “Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures” *Economics and Politics* 7, 207-227.

[15] Koren, Miklós and Silvana Tenreyro (2007) “Volatility and Development” *Quarterly Journal of Economics* 122, 243-287.

[16] Levchenko, Andrei A. (2007) “Institutional Quality and International Trade” *Review of Economic Studies* 74, 791-819.

[17] Lewis, Ethan (2011) “Immigration, Skill Mix, and Capital-Skill Complementarity” *Quarterly Journal of Economics* 126, 1029-1069.

[18] Nunn, Nathan (2007) “Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade” *Quarterly Journal of Economics* 122, 569-600.

[19] Prescott, Edward C. (1998) “Needed: A Theory of Total Factor Productivity” *International Economic Review* 39, 525-551.

[20] PWT 7.1: Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 7.1, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, July 2012.

[21] OECD, STAN database, ISIC Rev. 3

[22] Rajan, Raghuran and Luigi Zingales (1998) “Financial Dependence and Growth” *American Economic Review* 88, 559-86.

[23] United Nations Industrial Development Organization, *Industrial Statistics Database, 2-digit ISIC*, United Nations Industrial Development Organization, Vienna, 2012.

[24] *Worldwide Governance Indicators* (2011), The World Bank, Washington DC.

# A List of Sectors and Countries in Databases

**Table 11 – List of sectors (UNIDO**: only sectors 3 through 20)

| Number in Dataset | Sector Name |
|---|---|
| 1 | C01T05 Agriculture, hunting, forestry and fishing |
| 2 | C10T14 Mining and quarrying |
| 3 | C15T16 Food products, beverages and tobacco |
| 4 | C17T19 Textiles, textile products, leather and footwear |
| 5 | C20 Wood and products of wood and cork |
| 6 | C21T22 Pulp, paper, paper products, printing and publishing |
| 7 | C23 Coke, refined petroleum products and nuclear fuel |
| 8 | C24 Chemicals and chemical products |
| 9 | C25 Rubber and plastics products |
| 10 | C26 Other non-metallic mineral products |
| 11 | C27 Basic metals |
| 12 | C28 Fabricated metal products except machinery and equipment |
| 13 | C29 Machinery and equipment n.e.c |
| 14 | C30 Office, accounting and computing machinery |
| 15 | C31 Electrical machinery and apparatus n.e.c |
| 16 | C32 Radio, television and communication equipment |
| 17 | C33 Medical, precision and optical instruments |
| 18 | C34 Motor vehicles, trailers and semi-trailers |
| 19 | C35 Other transport equipment |
| 20 | C36T37 Manufacturing n.e.c; recycling |
| 21 | C40t41 Electricity, gas and water supply |
| 22 | C45 Construction |
| 23 | C50T52 Wholesale and retail trade; repairs |
| 24 | C55 Hotels and restaurants |
| 25 | C60T63 Transport and storage |
| 26 | C64 Post and telecommunications |
| 27 | C65T67 Finance and insurance |

| | |
|---|---|
| 28 | C70 Real estate activities |
| 29 | C71 Renting of machinery and equipment |
| 30 | C72 Computer and related activities |
| 31 | C73 Research and development |
| 32 | C74 Other Business Activities |
| 33 | C75 Public admin. and defence; compulsory social security |
| 34 | C80 Education |
| 35 | C85 Health and social work |
| 36 | C90T93 Other community, social and personal services |
| 37 | C95 Private households with employed persons |

**Table 12 – Countries in UNIDO dataset**

| Country number in dataset | Country name |
|---|---|
| 4 | Afghanistan |
| 8 | Albania |
| 12 | Algeria |
| 31 | Azerbaijan |
| 32 | Argentina |
| 36 | Australia |
| 40 | Austria |
| 44 | Bahamas |
| 50 | Bangladesh |
| 51 | Armenia |
| 52 | Barbados |
| 56 | Belgium |
| 60 | Bermuda |
| 68 | Bolivia (Plurinational State of) |
| 70 | Bosnia and Herzegovina |
| 72 | Botswana |
| 76 | Brazil |
| 100 | Bulgaria |
| 104 | Myanmar |
| 112 | Belarus |
| 116 | Cambodia |
| 120 | Cameroon |
| 124 | Canada |
| 144 | Sri Lanka |
| 152 | Chile |
| 156 | China |
| 158 | China, Taiwan Province |
| 170 | Colombia |
| 184 | Cook Islands |

| | |
|---|---|
| 188 | Costa Rica |
| 191 | Croatia |
| 196 | Cyprus |
| 203 | Czech Republic |
| 208 | Denmark |
| 214 | Dominican Republic |
| 218 | Ecuador |
| 222 | El Salvador |
| 231 | Ethiopia |
| 232 | Eritrea |
| 233 | Estonia |
| 242 | Fiji |
| 246 | Finland |
| 250 | France |
| 266 | Gabon |
| 268 | Georgia |
| 270 | Gambia |
| 275 | Palestinian Territories |
| 276 | Germany |
| 288 | Ghana |
| 300 | Greece |
| 320 | Guatemala |
| 332 | Haiti |
| 340 | Honduras |
| 344 | China, Hong Kong SAR |
| 348 | Hungary |
| 352 | Iceland |
| 356 | India |
| 360 | Indonesia |
| 364 | Iran (Islamic Republic of) |
| 372 | Ireland |

| | |
|---|---|
| 376 | Israel |
| 380 | Italy |
| 384 | Côte d'Ivoire |
| 388 | Jamaica |
| 392 | Japan |
| 398 | Kazakhstan |
| 400 | Jordan |
| 404 | Kenya |
| 410 | Republic of Korea |
| 414 | Kuwait |
| 417 | Kyrgyzstan |
| 418 | Lao People's Dem Rep |
| 422 | Lebanon |
| 426 | Lesotho |
| 428 | Latvia |
| 438 | Liechtenstein |
| 440 | Lithuania |
| 442 | Luxembourg |
| 446 | China, Macao SAR |
| 450 | Madagascar |
| 454 | Malawi |
| 458 | Malaysia |
| 470 | Malta |
| 480 | Mauritius |
| 484 | Mexico |
| 496 | Mongolia |
| 498 | Republic of Moldova |
| 504 | Morocco |
| 508 | Mozambique |
| 512 | Oman |
| 524 | Nepal |

| | |
|---|---|
| 528 | Netherlands |
| 530 | Netherlands |
| 531 | Curaçao |
| 533 | Aruba |
| 554 | New Zealand |
| 562 | Niger |
| 566 | Nigeria |
| 578 | Norway |
| 586 | Pakistan |
| 590 | Panama |
| 598 | Papua New Guinea |
| 600 | Paraguay |
| 604 | Peru |
| 608 | Philippines |
| 616 | Poland |
| 620 | Portugal |
| 630 | Puerto Rico |
| 634 | Qatar |
| 642 | Romania |
| 643 | Russian Federation |
| 646 | Rwanda |
| 682 | Saudi Arabia |
| 686 | Senegal |
| 702 | Singapore |
| 703 | Slovakia |
| 704 | Viet Nam |
| 705 | Slovenia |
| 710 | South Africa |
| 716 | Zimbabwe |
| 724 | Spain |
| 736 | Sudan (including South Sudan) |

| | |
|---|---|
| 740 | Suriname |
| 748 | Swaziland |
| 752 | Sweden |
| 756 | Switzerland |
| 760 | Syrian Arab Republic |
| 762 | Tajikistan |
| 764 | Thailand |
| 776 | Tonga |
| 780 | Trinidad and Tobago |
| 788 | Tunisia |
| 792 | Turkey |
| 800 | Uganda |
| 804 | Ukraine |
| 807 | The f. Yugosl. Rep. of Macedonia |
| 818 | Egypt |
| 826 | United Kingdom |
| 834 | United Republic of Tanzania |
| 840 | United States of America |
| 854 | Burkina Faso |
| 858 | Uruguay |
| 862 | Venezuela (Bolivarian Republic of) |
| 887 | Yemen |
| 891 | Serbia and Montenegro |