Innsbruck Student Papers in Economic and Social History

Papers by Students and Papers for Students

ISPESH 8

Transnational Corporations and Development

by Lukas Rainer

submitted July 2016, reviewed December 2016, published February 2017

A series of the research field "Economic and Social History" (at the same time working area "History of Globalization" in the Research Centre Empirical Economics and Econometrics ***EmpEc****) at the School of Economics and Statistics of Innsbruck University (Austria).*

Contact: Andreas Exenberger, Department of Economic Theory, Policy and History, University of Innsbruck, Universitaetsstrasse 15, A-6020 Innsbruck, e-mail: andreas.exenberger@uibk.ac.at

Eine Reihe des Forschungsfeldes „Wirtschafts- und Sozialgeschichte" (zugleich Arbeitsbereich „Geschichte der Globalisierung" im Forschungszentrum für Empirische Wirtschaftsforschung und Ökonometrie ***EmpEc****) an der Fakultät für Volkswirtschaft und Statistik der Universität Innsbruck (Österreich).*

Kontakt: Andreas Exenberger, Institut für Wirtschaftstheorie, -politik und -geschichte, Universität Innsbruck, Universitätsstraße 15, A-6020 Innsbruck, e-mail: andreas.exenberger@uibk.ac.at

URL: http://www.uibk.ac.at/empec/ispesh

Transnational Corporations and Development

by Lukas Rainer[*]

In this paper, various explanatory variables for worldwide income growth between 1970 and 2010 with special emphasis regarding transnational corporations (TNCs) are employed. A reverse causality problem regarding several regressors hinders causal inference. While the persistence of Siemens branches is positively correlated with a country's growth rate, TNC influence via high priced fertilizers is negatively correlated with income growth. By instrumenting the corruption perception index by the female share in national parliament, the reverse causality problem between income growth and the quality of institutions is mitigated.

After World War II, trade was institutionalized by the General Agreement on Tariffs and Trade (GATT), which was succeeded by the World Trade Organization (WTO) in 1995. According to the general goal of trade liberalization, the least developed countries (LDCs) were recommended to join the framework. Within structural adjustment programs of the International Monetary fund (IMF), countries could not really resist the "advice". To put it short, the period until the 1980s can be described as mainly influenced by a privatization and free trade mantra.

However, critical scholars from the dependency-theory school (Cardoso 1979, Frank 2008) and the world-system-theory school (Wallerstein 2004) questioned the international trade pattern already in the 1970s. They identified unequal terms of trade and therefore structural unequal gains of trade as a potentially overwhelming factor concerning economic development. Following Wallerstein (2004), the mechanism of a zero-sum game could be at work. One hypothesis therefore is that growth in developed countries (DCs) is on the cost of least developed countries (LDCs) accomplished by international trade incorporated by TNCs. This is similar to the "terms of trade" terminology of Prebisch and Singer (Prebisch 2008). They proposed that the terms of trade are positive for DCs and negative for LDCs. In relative terms, primary goods are sold at decreasing world market prizes and processed goods are sold at increasing world market prizes leading to an increasing gap between DCs and LDCs.

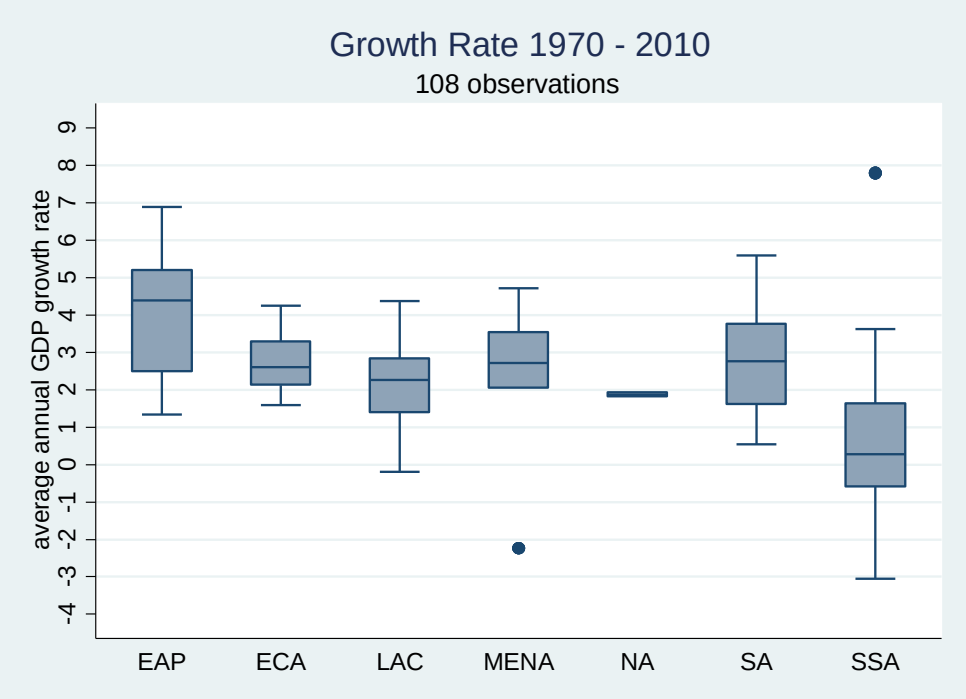
In recent years, the institutional approach gained more influence and a body of literature (such as Acemoglu et al. 2001) emerged claiming that there is a causal link between institutions and economic growth. However, probably the crux in this context is the reverse causality issue, whether good institutions cause economic growth or growth causes good institutions. Econometricians typically employ instrumental variables to mitigate reverse causality problems. Mauro (1995), for instance, used ethnolinguistic fractionalization to instrument corruption as it is significantly correlated with proxies for institutional quality and he assumes that there is no other influ-

[*] At the moment of writing, Lukas Rainer is master student of applied economics at the University of Innsbruck. A previous version of this paper was provided as seminar paper in economic and social history. Contact: l.rainer@student.uibk.ac.at.

ence on economic growth than through its effects on institutional efficiency. Mauro concludes that the causal direction goes from corruption to income. However, there is by far no consensus in the literature. Gundlach and Paldam (2009) use biogeographic measures from Olsson and Hibbs (2005) as instruments for modern income levels to argue that long-run causality entirely goes from income to corruption.

Not only development economists but also macroeconomists attempt to identify the sources of economic growth since decades. Growth theory emerged as an own branch of the field. In a both popular and controversial paper, Baumol (1986) used a cross section of 16 countries from 1870 to 1979 to offer an optimistic outlook towards convergence between rich and poor countries. Thus, countries with a low initial per capita income level experienced higher growth rates than rich countries in his sample. DeLong (1988) criticized Baumol on his sample and showed a diminishing tendency towards convergence when using a larger sample. Barro (1991) used 98 observations from 1960 to 1985, concludes the same weak correlation of income level and income growth and added explanatory variables that are correlated with growth. One of his main conclusions is that once proxies for human capital like the school-enrolment-rate are added, both the initial income level and the human capital get significant with the intuitively expected signs. This empirical analysis is in line with this conditional convergence approach, though TNC related, and therefore rather unconventional control variables are employed.

GRAPH 1



Notes: EAP: East Asia Pacific, ECA: Europe and Central Asia, LAC: Latin America and the Caribbean, MENA: Middle East and North Africa, NA: North America, SA: South Asia, SSA: Sub-Sahara Africa

One can immediately see that growth varies a lot between and within regions. Growth in SSA is of special interest since it has distinctively the lowest mean. Standard deviation, as reported in table 1, is highest in MENA, followed by SSA and SA. The negative outlier in MENA is Djibouti and the positive outlier in SSA is Botswana where per capita income increased twentyfold. With 7.79 percent, the average growth rate there is more than twelve times larger than the mean of SSA.

TABLE 1
LOG PER CAPITA INCOME GROWTH PER REGION

$logY_{2010} - logY_{1970}$ (in terms of expenses)				
Region	Mean	Std. Dev.	g [percent]	Observations
EAP	1.628	0.655	4.17	15
ECA	1.075	0.296	2.73	24
LAC	0.870	0.440	2.21	24
MENA	0.910	0.877	2.32	7
NA	0.744	0.028	1.88	2
SA	1.119	0.756	2.85	5
SSA	0.248	0.785	0.64	31
World	0.872	0.767	2.18	108

Notes: Yearly average growth rate: $g = e \wedge [(logY_{2010} - logY_{1970}) / 40] - 1$.

While the region East Asia and Pacific experienced annual growth rates of about 4 percent, which underlines a catch up dynamic of that region, the graph illustrates the unsatisfactory development in Sub-Sahara Africa. 12 out of the worldwide 14 countries with negative per capita income growth from 1970 to 2010 are from Sub-Sahara Africa. Liberia, shrinking from 2,000 to 560 USD per capita, experienced the worst development. On the other hand, on aggregate, it seems that Africa had followed the free trade advice. Merchandise exports grew from roughly 100 Billion in 1990 to 600 Billion USD in 2011 (WTO 2013: 76). Another fact of interest is the high extra-regional trade share of African exports: 87 percent of all African merchandises leave the continent, which is the highest share of all (WTO 2013: 76). Regarding the weak per capita income growth while observing high export growth in Sub-Sahara Africa necessarily leads to question the gains from trade for African countries. The improvement of institutions alone, without changing the existing trade pattern, might not be enough for economic progress in LDCs given the persistence of negative terms of trade. Therefore, those trade-critical theories still might provide powerful explanations for development and hence should be considered in the recent academic discussion as well. In the paper, we will analyze the international trade pattern by focusing on the "big players" on the world market, namely transnational corporations (TNCs), and investigate their impact on economic development.

Setting this idea in the historical context, we arrive at the following hypotheses: While exploitation of LDCs, such as in form of the slave trade or the extraction of precious metals and natural resources, was more or less publicly governed by (European) national states during colonial rule, it is governed privately by TNCs nowadays. Though the comparison might appear harsh and information about the actual violence involved nowadays is

less obvious compared to the colonial rule, there are numerous examples such as the still scandalizing working conditions in mining, which justify the hypothesis. Trade openness, and particularly import openness, may cause extrusion of domestic corporations by TNCs since the precondition for a fair competition simply does not exist. Technological lead, financial capacity, a low tax burden or all advantages regarding economies of scale are typical characteristics of TNCs. Domestic companies will likely be unable to compete at a free market. This may permanently hinder domestic corporations doing investments and hence LDCs are not able to reduce the gap to the DCs. For the past, largely state-influenced TNCs like the East India Company are exemplary as it exploited trade profits in Southeast and East Asia in an imperialistic manner on the cost of slavery or famines (Encyclopaedia Britannica 2016). Nowadays TNCs are different of course, but in terms of profit margins sometimes comparable. The annual report of Nestlé S.A. (société anonyme) in 2010 states sales of roughly 110 Billion CHF with a net profit of 34 Billion CHF. Sales, employees and factories are well diversified over the whole globe. The group employs 280,000 people with the biggest share of 40 percent in the Americas, it owns 443 factories in 81 countries and it sells its products in 140 countries. The only outlier from this global diversification is the ownership structure which is still dominated by European and particularly Swiss shareholders of 55 respectively 36 percent. Adding the 25 percent of US shares, the rest of the world owns only roughly 20 percent of the Nestlé group. According to the report, the group's goals are not restricted to business performance figures but also include value creation for society such as sustainability and fostering rural development. Numerous corresponding reports such as the "Creating Shared Value Report" or the "Nestlé Policy on Environmental Sustainability" are easily accessible publicly.

This example shows that in the beginning TNCs had a colonial, largely state-influenced character, where goals of exploitation on behalf of the (British) empire were explicitly stated. It is unthinkable that such statements are still expressed in the business reports of TNCs today where actually the opposite is written down. If the business practice of TNCs really changed that dramatically over time is subject to debate and lies beyond the scope of this paper. According to world system theory, the trade pattern of TNCs might be an important channel for ongoing, historically grown exploitation schemes and probably one of the most critical issues is the lack of transparency and regulatory sovereign. State-influence on TNCs is definitely shrinking and therefore the exposure of TNCs to national regulations and tax liabilities reached a very small scale. This suggests the hypothesis that well-intentioned development policies might be undermined by the overwhelming market power of TNCs that are not tangible for potential regulatory powers. However, once harmful activities of TNCs on LDCs are identified, the development discourse can be enriched. By using TNC related explanatory variables for income growth, this paper elaborates on this question empirically.

The rest of the paper is structured as follows. Section 2 describes methodology and data. In section 3 the econometric results are presented. Section 4 concludes and discusses policy implications. The appendix provides further descriptive statistics and illustrates the endogeneity problem.

METHODOLOGY

Firstly OLS-regressions, secondly panel data and thirdly instrumental variables are used for econometric analysis. Data collection involves a trade-off between timespan and country coverage. On behalf of inclusiveness the latter was higher weighted than the former and data for 142 countries was collected for the time period 1970 to 2010.[1] Data was available for even decennial time points, which yields a panel of 142 units with five observations each.

OLS Cross Section:

$$(1) \qquad g_i = \beta_0 + \beta_1 \, logrYpc\_e_{i,1970} + \beta_k \, X_{i,1970} + e_i$$

Following a conditional convergence set-up, it is controlled for the initial GDP level of 1970. X_k is a matrix of explanatory variables as listed in table 2.

Panel Data, fixed effects model:

$$(2) \qquad g_{i,t} = \alpha_i + \beta_1 \, Ypc\_elagged_{i,t} + \beta_k \, X_{i,t} + u_{i,t}$$

We follow i countries over t years. The country fixed effects are incorporated in the dummy α_i for each country. The first explanatory variable is lagged GDP and the other explanatory variables are in the matrix $X_{i,t}$.

Instrumental variables, two stage least squares (2SLS):

$$(3.1) \qquad g_i = \beta_0 + \beta_1 \, logrYpc\_e_{i,1970} + \beta_2 \, CPI_i + \beta_k \, X_{i,1970} + e_i$$

Equation (3.1) is in principle the same as equation (1). Since *CPI* (Corruption Perception Index) is correlated with the error term e, it is instrumented by Z in (3.2). The first stage, the regression of *CPI* at the instruments, is the following:

$$(3.2) \qquad CPI_i = \pi_0 + \pi_1 \, Z_i + v_i$$

In the second stage (3.2) the fitted values for CPI are obtained, which are then plugged in the initial regression of interest (3.1) instead of CPI.

DATA

Dependent variable: average annual growth rate of per capita income 1970-2010: Data for gross domestic product (GDP) and population size is used from the Penn World Tables (PWT 2015). Expenditure-side real GDP per capita at chained purchasing power parities (PPPs in 2005US$ millions) is considered as most helpful to evaluate economic development and is therefore used in the following analysis.

Trade variables: As trade indicators, membership in the WTO or the former GATT and the trade dispute record of the WTO are used (WTO

[1] For the time period 1990-2010 data from 24 additional countries is available, whereas a lot of them did not exist before the implosion of the Soviet Union, leading to a rich sample of 166 countries. Due to the short time-span and particular short-term developments in the Ex-Soviet countries, which were often accompanied with negative growth rates in the 1990s, the 1970-2010 sample is regarded favorable for the analysis.

2016). Trade disputes were distinguished between countries as complainants and as respondents and separately counted per decennial period, while the former category is regarded as the better trade indicator in terms of trade-rights enforcement. Trade disputes are regarded as of special interest since LDCs hardly run such disputes. In 2004, Bangladesh was the first LDC WTO member that acted as a principal party to a dispute (WTO 2010). DCs seems to act more proactive in ensuring "fair" trade relations for their states. They are more aware of their dispute possibilities and have the resources for realizing it. Hence, there might be a reverse causality issue.

Imports and exports, as shares in GDP, disaggregated by the following sectors are taken from the Penn World Tables as well (PWT 2015). The share of food and beverage goods imports and exports in GDP is an indicator for activity in the market for primary goods, which is of interest according to dependency theory. The same holds for capital goods, which are considered as important because of their relevance as an input factor. Lastly data on consumption goods trade is taken, regarded as meaningful according to dependency theory as well.

Proxies for transnational corporations: While all trade indicators incorporate TNC activity loosely, more specific data is needed for identifying the TNCs' relation to single countries to measure their potential influence on economic development. An ideal indicator therefore would be something like the ratio of TNCs' revenues in a country to the GDP of that country to easily observe the importance of TNCs per country. Obviously, this is not possible in practice since there are no statistical bureaus counting that or TNCs typically state their revenues aggregated per broad geographic regions. The Nestlé group for instance splits up its revenue by only three regions, namely Europe, the Americas and Asia-Oceania-Africa. To proxy TNC activity, two TNCs from the Forbes (2015) biggest companies list where chosen. As the leader in the food and beverage category and Forbes 30, Nestlé was regarded as representative for big TNCs and hence a dummy variable for Nestlé factories in a country according to the company's annual report (Nestlé 2001, Nestlé 2011) are used. Siemens was also considered because of its importance for infrastructure projects, its historical dimension and its scale. Founded in 1847, Siemens has 348,000 employees in more than 200 countries in 2015 and is listed as Forbes 54. In the dataset, the year of Siemens formation in a country is recorded and therefore the duration of Siemens influence per country can be used. One backlash is that closed national branches are not listed by Siemens anymore and therefore only successful branches are in the dataset (Siemens 2016).[2] Hence, we are facing a severe sample selection bias.

Data for the use of fertilizer per hectare of arable land are used from the WDI (World Development Indicators) database (World Bank 2016). Fertilizer consumption can be regarded as another TNC proxy, because TNC activity and fertilizer use are highly correlated. Both, the size of supply as well as demand suggest strong TNC involvement. For the supply side, the

[2] Data for General Electrics, listed as Forbes ninth biggest company with operations in 130 countries, and data for Coca Cola, listed as number 93 and regarded as an important player in the beverages market, was collected as well, but regarded as weakly meaningful due to limited data availability regarding countries and time (Coca-Cola Company 2016, General Electrics 2016).

global fertilizer market is considered as highly concentrated. The American Antitrust Institute observes an oligopoly with few agents (Taylor and Moss, 2013). Therefore, the purchase of fertilizers is very likely TNC related, and oligopolistic price determination is very likely an important reason for the poor countries' low demand of fertilizers. In countries with "agro-industrial" features, profit-maximizing TNCs are often involved in demand that typically use fertilizers intensively. Additional data for male employment in agriculture to total male employment is taken from the WDI. Dividing the fertilizer consumption per hectare by the percentage of male employment in agriculture yields a (maybe unconventional) indicator of capital-intensity in the primary sector. Concerning the dependent variable, this ratio inherits a reverse causality problem but when controlled for initial income level (as of 1970) the problem will become smaller.

Proxy for the quality of institutions: To capture corruption, the corruption perception index (CPI), is taken from Transparency International primarily as of 2000, and if not available there as of 2010. The Index ranges between 0 (highly corrupt) and 10 (highly clean). Many institutional features – such as the quality of legal institutions or bureaucratic efficiency – are highly correlated with corruption. Hence, the CPI is used as a proxy for the quality of institutions. To mitigate the reverse causality problem, it is instrumented by the female share in national parliaments and the Nestlé factory dummy.

Female share in national parliaments: For measuring gender equality, data for the proportion of seats held by women in national parliaments is used from the WDI.

Additional control variables: Population size, taken from the Penn World Tables (PWT 2015) as well, is used in logarithmic form. Another dummy variable for countries with extraordinary large financial markets is applied. As a proxy, a financial system deposits to GDP-ratio higher than 100 percent in 2005 is used (World Bank 2013). In addition, a dummy regarding financial secrecy is used, when the top 15 offshore destinations, according to the Tax Justice Network (2015), are included.

Exclusion of countries with extractive wealth or persistent violence: Furthermore, there are strong arguments to exclude two country-types. Firstly, countries with a GDP particularly based on extractive wealth should be excluded, as it was done by Olsson and Hibbs (2005), because these would bias the result when one regress GDP on indicators others than natural resources. The oil rents to GDP ratio was used as a proxy for extractive wealth. Countries with a share of more than 20 percent in 1990 are excluded. This arbitrary threshold excludes 14 countries, with 6 from the region Middle East and North Africa. Except the Republic of Congo and Syria, which are excluded due to the criterion above, we excluded the same countries as Olsson and Hibbs (2005).[3]

[3] Namely Angola, Bahrain, Brunei, Congo Republic (Brazzaville), Gabon, Kuwait, Nigeria, Oman, Qatar, Saudi Arabia, Syria, Trinidad and Tobago, and Venezuela. Equatorial Guinea was excluded as well, though oil shares jumped above the 20 percent threshold only from 1996 onwards (and GDP per capita, while shrinking between 1970 and 1990, increased tenfold between 1990 and 2000).

Secondly, there are good reasons that countries with persistent violence should be treated in a model of their own, such as Besley and Persson (2011) did it, and again could bias estimations substantially since violence indicators potentially could explain more than economic indicators. Referring data was used from the armed conflict dataset (Pettersson and Wallensteen, 2015; (Sundberg, Eck, and Kreutz, 2012). Countries are excluded on behalf of the persistence of either a state conflict with more than 1,000 battle related deaths per year or the persistence of a non-state conflict with more than 500 fatalities per conflict year.[4]

Applying the criteria leads to exclude 24 countries, with 11 of them from Sub-Sahara Africa.[5] There are three countries having both high oil rents and persistent conflict, namely Angola, Nigeria and Syria. After dropping the countries with at least one of the exclusion criteria, 108 countries remain in the sample for the period 1970-2010.[6]

EMPIRICAL RESULTS

In this section, we analyze whether development performance measured by GDP growth between 1970 and 2010 differs between countries with high and low TNC activity.

In the first approach, OLS regressions are applied on the cross section of the 108 remaining countries. In line with Baumol (1986), the only explanatory variable is initial per capita income (of 1970). Hence, we follow an unconditional convergence set-up. In contrast to Baumol's very limited number of 16 countries but a wide time span from 1870 to 1986, a shorter time span and progress in data availability helps diminishing a selection bias as firstly criticized by DeLong (1988).

A first empirical fact is obvious. The development in Sub-Sahara Africa seems to be very different from the rest as can be seen in table 3 and graph 2. Hence, it is crucial whether Sub-Sahara Africa is included in the regressions or not. The right-hand side of the panel excludes it. When doing so, convergence as indicated by the negative and highly significant coefficient of GDP in 1970 is observed. If the initial per capita income increases by 10 percent, aggregate growth decreases by [0.549 x ln(1.1)=] 0.052 percentage points ceteris paribus as can be seen in regression (2). Considering the whole sample (1) including SSA, the correlation is practically zero.[7]

[4] A country is considered as in persistent conflict if either a state conflict (with more than 1,000 battle related deaths per year) took place in two consecutive decennials or the sum over all decennials with either a state- or a non-state conflict is at least 3. India, although having state-conflict in the decennials 1990, 2000 and 2010, is not considered as in persistent conflict due to its large population. This criterion is to some extend arbitrary, but it should reflect the problems for development when a country suffers from long-lasting or repeating violence.

[5] Namely Angola, Congo (Kinshasa), Colombia, Ethiopia, Iran, Iraq, Israel, Cambodia, Sri Lanka, Mozambique, Nigeria, Nepal, Peru, the Philippines, Rwanda, Sudan, El Salvador, Serbia, Syria, Chad, Turkey, Uganda, Vietnam and South Africa.

[6] 142 – 14 (oil) – 23 (persistent violence) + 3 (double counted) = 108

[7] Botswana constitutes the striking outlier in the northwest of graph 2 as it has the highest growth rate during the period and one of the lowest initial GDPs per capita. When excluding it, the slope of the regression line doubles and the initial per capita income would be significant at the 17.3 percent level (which is still far from the convention for statistical significance, but some tendency towards divergence would emerge).

TABLE 2
VARIABLE DEFINITIONS

Variable	Description	Time
g	Average annual growth rate of per capita income (real PPP GDP in terms of expenses) computed as follows: 1) cross section: $g = e \wedge [(\log Y_{2010} - \log Y_{1970}) / 40] - 1$ 2) panel: $g = e \wedge [(\log Y_{t} - \log Y_{t-1}) / 10] - 1$	1970–2010
logrYpc_e	Initial log per capita income (real PPP GDP in terms of expenses)	1970
Ypc_e lagged	log per capita income (as above) in the previous period	1970–2000
WTO	Dummy indicating WTO/GATT membership	1970–2010
dispc	Dummy for WTO trade dispute as complainant	1995–2016
sh_fem	Share of female MPs in national parliament	2000
$Siemens_{2010}$	Years of national Siemens branch	2010[8]
Nestléf	Dummy for Nestlé factory	2000, or 2010
dispc	Dummy for WTO trade dispute as complainant	1995–2016
logpop	Log of Population size	1970
logFtoN	Log of fertilizer consumption per hectare divided by share of male employment in agriculture	2000, or close to[9]
CPI	corruption perception index, 0 (highly corrupt) to 10 (highly clean)	2000, 2010 else
gx1	Growth in share of food and beverage goods exports in GDP computed for all categories as follows: 1) cross section: $g_i = (exports_{i,2010} / GDP_{2010}) / (exports_{i,1970} / GDP_{1970})$ 2) panel: $g_{i,t} = (exports_{i,t} / GDP_t) / (exports_{i,t-1} / GDP_{t-1})$	1970–2010
gm1	Growth in share of food and beverage goods imports in GDP	1970–2010
gx1	Growth in share of food and beverage goods exports in GDP	1970–2010
gm4	Growth in share of capital goods imports in GDP	1970–2010
gm6	Growth in share of consumption goods imports in GDP	1970–2010
SSA	Sub-Sahara Africa dummy	1970–2010

The same role of SSA holds for convergence with respect to WTO membership. When excluding it (4), convergence is like in the world without SSA sample. When including it (3), WTO-membership is estimated with a significant positive coefficient and hence indicates divergence within the WTO club, which seems remarkable. However, an omitted variable bias and hence an endogeneity problem is very likely in the simple set-up as can be seen in graph 6 in the appendix.[10] Therefore and due to the special interests

[8] Note the selection bias embodied in this data, because there is only data for successful branches available.

[9] Note the problem of reversed causality embodied in this data, because data prior to 2000 is not available. Missing SSA values were excluded in (3) and estimated by SSA-mean in (4) in table 3.

[10] The error terms are highly correlated with the dependent variable as can be seen in the appendix. Hence, the OLS-estimator is no longer unbiased and consistent and inference could be misleading.

of TNC related variables, multivariate regressions are applied. The results of these richer specifications are presented in table 4.

TABLE 3
PER CAPITA INCOME GROWTH AND INITIAL INCOME LEVEL

VARIABLES	(1)	(2)	(3)	(4)
	g			
Region	World	World without SSA	WTO World 1970	WTO World 1970 without SSA
logrYpc_e	0.113	-0.549	0.456	-0.595
	(0.66)	(3.99)***	(2.54)**	(2.52)**
_cons	1.255	7.432	-1.796	8.033
	(0.84)	(6.07)***	(1.10)	(3.62)***
R2	0.003	0.114	0.084	0.172
F	0.4	15.9	6.5	6.3
N	108	77	62	43

Notes: Robust t-statistics (White Standard Errors used) in parentheses; *** significant at α = 0.01, ** significant at α = 0.05

GRAPH 2
GROWTH AND INITIAL INCOME LEVEL

At first, the results referring to (1) are discussed. If the initial income of 1970 increases by 10 percent, the average growth rate decreases by [0.827 x ln(1.1)=] 0.079 percentage points ceteris paribus. This is in line with the conditional convergence arguments of Barro (1991) that once controlling for other variables the initial income level gets significant. Countries from Sub-Sahara Africa grow by 2.47 percentage points less ceteris paribus,

which is highly significant and remarkable. One has to keep the average worldwide growth rate of 2.16 percent in mind as reported in table 1.

TABLE 4
PER CAPITA INCOME GROWTH AND TNC PROXIES

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
			g		incl. SGP	excl. SGP
logrYpc_e	-0.827	-0.969	-1.197	-1.373	-1.025	-1.036
	(3.94)***	(4.03)***	(4.80)***	(4.94)***	(5.44)***	(5.23)***
WTO	0.015	-0.275	-0.362	-0.027		
	(0.03)	(0.62)	(0.83)	(0.07)		
dispc	1.175	1.151	0.499	0.499		
	(2.12)**	(2.05)**	(1.05)	(1.14)		
logpop	-0.145	-0.205	-0.251	-0.216		
	(1.92)*	(1.43)	(2.12)**	(1.92)*		
SSA	-2.469	-1.287	-0.525	-0.889		
	(4.54)***	(2.03)**	(0.66)	(1.30)		
siemens2010		0.012	0.010	0.008		
		(2.40)**	(2.06)**	(1.89)*		
nestlef		-0.718	-0.056	-0.160		
		(1.49)	(0.16)	(0.47)		
gm1		-0.002	-0.007	-0.007		
		(0.54)	(4.25)***	(3.72)***		
gx1		-0.047	-0.032	-0.020		
		(2.65)***	(2.24)**	(1.18)		
gm4		0.008	0.008	0.008		
		(2.77)***	(4.84)***	(3.85)***		
gm6		0.003	0.006	0.006		
		(1.69)*	(4.05)***	(3.75)***		
gx6		-0.012				
		(4.47)***				
sh_fem			0.006	0.018		
			(0.43)	(1.08)		
logFtoN			0.428	0.465	0.620	0.627
			(4.60)***	(5.07)***	(9.71)***	(8.71)***
_cons	9.224	10.610	11.391	12.462	9.687	9.776
	(5.72)***	(5.78)***	(6.08)***	(6.05)***	(6.28)***	(6.06)***
R2	0.367	0.462	0.604	0.599	0.480	0.454
F	12.0	100.3	163.8	116.9	49.7	39.9
N	108	95	87	99	99	98

Notes: Robust t-statistics (White Standard Errors used) in parentheses, *** significant at α = 0.01, ** significant at α = 0.05, * significant at α = 0.10, SGP (Singapore) is excluded in (6) due to its high fertilizer consumption.

For the richer specification (2) the convergence indicator by the coefficient of the initial income level does slightly increase compared to (1). The marginal effect of the trade dispute dummy is significant at the 5 percent level and the magnitude of the marginal effect is substantial. Countries which run a trade dispute have a by 1.15 percentage points higher growth rate everything else constant. However, one should keep in mind that this

explanatory variable may incorporate a lot, such as quality of institutions, and is therefore subject to both an endogeneity and reverse causality issue. The causal link could go from economic progress to institutional quality expressed in terms of WTO complains as well. Controlling for more variables almost halves the Sub-Sahara Africa dummy. However the difference in the growth rate of minus 1.29 percentage points compared to the other world regions ceteris paribus is still immense. The existence of a Siemens branch in a country for an additional 10 years increases the growth rate by 0.12 percentage points ceteris paribus. However, due to potential selection bias of the available Siemens data where only successful and still existing branches are reported, this interpretation should not be given too much weight. However, to some extend the argument is reasonable that the persistence of Siemens is favorable for economic growth since it likely has positive spill-over effects to the quality of infrastructure. The Nestlé factory dummy is with a p-value of 0.14 not significant. Since this dummy is as of 2000 or later, the informative value is limited anyway. If exports of food and beverages grow by 100 percentage points, the growth rate decreases by 0.047 percentage points ceteris paribus[11]. This could be contextualized with the terms-of-trade debate (Prebisch 1964) that countries which export more primary goods experience weaker economic development. If imports of capital goods grow by 100 percentage points, the growth rate increases by 0.008 percentage points ceteris paribus. One can argue that capital goods imports seem to pay-off their investment as they can be used productively. However, the marginal effect is rather small and causality could go the other way around as well. For growing economies, capital goods imports are more affordable than for poor ones. If exports of consumption goods increase by 100 percentage points, income growth decreases by 0.012 percentage points ceteris paribus. This is somehow counterintuitive, but the effect is small.

The difference between (3) and (4) is the following. The former exclusively contains countries with specific data for fertilizer consumption, which has both the disadvantage of the limited coverage of only 87 countries and a selection bias due to underrepresentation of low-income countries.

The coverage of countries from Sub Sahara Africa is particularly weak. In (4) this problem was dealt with estimating the fertilizer consumption of the uncovered countries from Sub-Sahara Africa by the mean of the covered countries from that region.[12] The probably most interesting feature of (3) and (4) is that the dummy for Sub-Sahara Africa disappears, which indicates that the additional variables do a good job in explaining determinants for income growth more inclusively. The negative marginal effect of initial income gets larger than in (1) and (2). If per capita income of 1970 increases by 10 percent in (4), the growth rate decreases by 0.13 percentage points ceteris paribus. In (3) and (4) also the growth in imports of food and beverages are highly significantly correlated with growth. If they increase by 100 percentage points, the growth rate decreases by 0.007 percentage points ceteris paribus. Growth in the share of food and beverages exports is

[11] As computed as: [$g_i = (exports_{i,2010} / GDP_{2010}) / (exports_{i,1970} / GDP_{1970})$] a one unit change constitutes a change by 100 percentage points.

[12] The still uncovered countries (9) should not cause a big selection bias problem since most of them are islands with both small population and size like the Bahamas or the Fiji Islands.

no longer significant when the capital intensity in the primary sector is controlled for (4). The marginal effect of growth in consumption goods imports is twice as large as in (2).

The fertilizer per hectare divided by the share of male employment in agriculture, used as a measure of capital intensity in the primary sector, explains the special role of Sub-Sahara Africa quite well. Descriptive statistics about the variables used are documented in the appendix. When this capital intensity increases by 100 percentage points, the growth rate increases by [0.465 x ln(2)=] 0.32 percentage points ceteris paribus (4). Since this indicator is from 2000, the direction of causality could be reverse. Due to low income fertilizer may not be affordable. This is particularly worsened by the oligopolistic supply structure of the world market for fertilizers (Taylor and Moss, 2013). Together with high shares of employment in agriculture, which is typically for low income countries, this leads to low capital intensity in the primary sector. This could hinder development, since too much labor is needed for pure subsistence.

Because of the high correlation of capital intensity in agriculture and income growth, the reduced regressions (5) and (6) have quite some explanatory power and the exclusion of Singapore does not really make a difference. If the capital intensity in the primary sector increases by 100 percentage points, the growth rate increases by 0.43 percentage points ceteris paribus (5). Regarding explanatory power, the proportion of explained deviation of income growth is with 48 percent in (5) higher than in (2), but with the remarkable difference of using just two instead of 12 explanatory variables. Still the weakness of applying variables from 2000 for explaining income growth for the period 1970 to 2010 due to limited data availability should be kept in mind regarding the reverse causality issue. However, the channel seems plausible that too expensive fertilizers, built up by TNCs operating on the world market with highly oligopolistic features, is an obstacle for development in LDCs.

PANEL DATA ANALYSIS

As far as data availability allows, a panel analysis is used to look beyond the OLS cross-section above. There are five decennial time observations for each unit from 1970 to 2010. Since the growth rate of GDP per capita is considered as the dependent variable, there are four observations per unit. Descriptive statistics are provided in the appendix, table 8. In the panel, we use per capita income lagged by ten years in contrast to per capita income of 1970 in the cross-section. The persistence of the endogeneity problem calls for the use of a fixed rather than a random effects model since the explanatory variables are very likely correlated with the unobservable country fixed effects. For instance, it is most likely that the observable trade flows are highly correlated with the unobservable institutional or cultural features of a country. The fixed effects model is preferable on the basis of a Hausman test as well[13]. Controlling for the omitted variable bias comes at the cost of ignoring observable country characteristics that are time invariant

[13] The Hausman test gives a test statistic (chi-squared, 5 degrees of freedom) of 68 and a p-value of zero. Hence, the H_0 of the Hausman test must be rejected and we use the fixed effects model.

such as the existence of a Nestlé factory. Limited data availability additionally causes the problem that variables, which typically vary over time, have to be treated as time invariant such as the corruption perception index. Hence, the following panel results are rather compact, as documented in table 5.

TABLE 5
PANEL DATA, FIXED EFFECTS MODEL

VARIABLES	g
Ylag	-2.479
	(8.23)***
gx1	-0.160
	(1.76)*
gm4	0.293
	(2.07)**
gm6	-0.284
	(2.52)**
gx6	-0.025
	(1.83)*
_cons	24.119
	(9.26)***
R2 within	0.238
R2 between	0.049
F	17.5
Observations[#]	380
Number of countries[#]	95

Notes: t-statistics in parentheses, *** significant at α = 0.01, ** significant at α = 0.05, * significant at α = 0.10

[#] The following 13 countries are excluded because of partly missing data for consumption goods exports: Burundi, Bhutan, Central African Republic, Comoros, Cap Verde, Guinea, Gambia, Guinea-Bissau, Liberia, Mali, Niger, Sao Tome and Principe, Togo. Hence, note the selection bias involved.

If income at the beginning of the decennial period is by 10 percent higher, everything else constant the country has a by 0.24 percentage points lower growth rate. The marginal effect is almost twice compared to the cross section (4) of table 4. This difference is not surprising as we expect stronger convergence once country fixed effects are controlled for. If growth in food and beverage goods exports increases by 100 percentage points, the growth rate decreases by 0.16 percentage points ceteris paribus. While only significant at the 10 percent level, the marginal effect is more than three times larger than in the cross section (2) of table 4. If growth in capital goods imports increases by 100 percentage points, everything else constant the growth rate increases by 0.29 percent. The marginal effect is about 8 times larger than in the cross-section regressions of table 4. The effects regarding growth of traded consumption goods are negative for both exports and imports, but the adverse effect is eleven times more severe for imports.

If growth in consumption goods imports increases by 100 percentage points, the growth rate decreases by 0.28 percentage points ceteris paribus. Again, this is in line with the negative-terms-of-trade hypothesis. While the effects for food and beverage goods imports and consumption goods exports do not really matter in the fixed effects model, the food and beverage goods

exports and consumption goods imports do as they are negatively correlated with income growth.

During the 1970s, the region Europe and Central Asia increased food and beverage goods exports the most. In the 1980s, Sub-Sahara Africa increased exports of the same sector the most. In the 1990s and 2000s, the regions East Asia Pacific and South Asia increased their exports the most. While the regions Latin America and the Caribbean and Sub-Sahara Africa had the lowest growth in consumption goods imports in the 1970s, they increased them the most in the 2000s. The former decennials where dominated by the regions East-Asia Pacific and to a smaller extend by Europe and Central Asia.

INSTRUMENTAL VARIABLE APPROACH

Two instrumental variables are used to address the reverse causality problem of income growth and the quality of institutions. The quality of institutions is proxied by the CPI, ranging from 0 (highly corrupt) to 10 (highly clean). International Organizations such as the OECD do not only emphasize the adverse effects of corruption on income growth but also the responsibility of TNCs regarding the issue (OECD 2017).

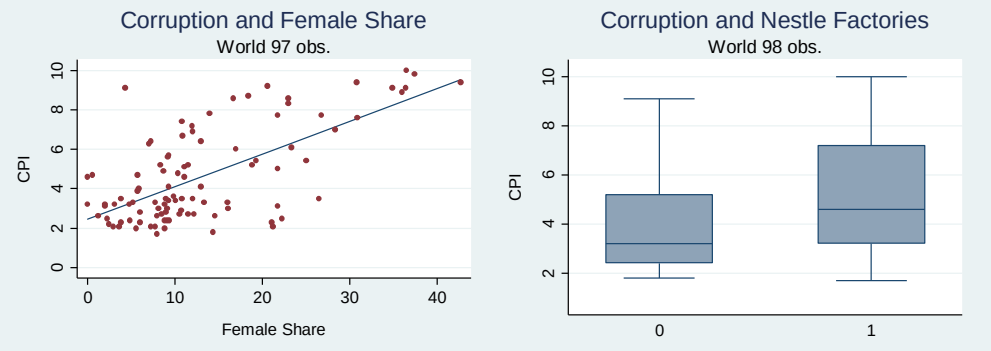
We instrument corruption by the share of female members in national parliaments. The relevance of this instrument regarding corruption is intuitive. Corruption is most persistent in environments where the political elite does hardly change. In general, it seems realistic that the elite was male dominated in the 1970s. Since data for the female share is of 2000, one can argue that countries having a higher female share in 2000 experienced more elite exchange and hence broke up potential corruption more likely than the countries with low proportions of female politicians in 2000. The first stages of the two stages least squares estimator (2SLS), as reported in table 6, show strong correlation between corruption and the female share. As the F-statistics are above 19 the relevance, which is the first requirement of a good instrument, should be guaranteed[14]. The left side of graph 3 underlines the correlation graphically. Singapore, with a CPI of 9.10 and a female share of only 4.3 percent, is the outlier.

For satisfying the exclusion restriction, it must hold that there is no other channel, such as female labor force participation, through which the female share drives income growth than the quality of institutions. In the case of female labor force, participation the supply of childcare facilities is essential, which is arguably a matter of institutions in terms of the provision of public services. The demand for childcare is also correlated with the quality of institutions, namely informal ones. El-Attar (2013) shows that trust matters for child-care decisions, which subsequently affects labor market decisions. Hence, a corrupt environment is destructive for female labor force participation in two ways. There is not only a lack in supply of childcare facilities but also a lack in trust that prevents parents from utilizing them. Hence, we argue that the female share exclusively effect income growth through the quality of institutions. Regression (3) and (4) of table 4 show

[14] Stock and Yogo (2005) argue that the first stage F-statistic of a relevant instrument should be greater than 10.

that the female share is far from significantly correlated with the growth rate when other controls, that proxy institutional quality such as the WTO dispute dummy, are applied. This is also suggestive that the exclusion restriction holds.

GRAPH 3
RELEVANCE OF THE INSTRUMENTS



For the second instrument, a variable regarding TNCs is used. The connection between TNCs and corruption is ambiguous. Some literature suggests that TNC activity helps to reduce corruption, as TNCs increase competition and market efficiency and introduce good governance. Other literature argues quite the contrary. Using data from Chinese provinces, Zhu (2017) finds that more TNC activity is associated with more corruption. If China is regarded as representative for other developing countries, one can argue that TNC activity may deepen corruption rather than help to overcome it. Hence, TNC activity could hinder development in LDCs by sustaining established structures of corruption. This reasoning is in line with Wallerstein's world system theory, where the elites of both the LDCs, in form of corrupt governments, and the DCs, in form of TNCs, exploit the peripheries. Since the analysis captures both DCs and LDCs, data shows that TNCs have settled more in less corrupt countries, as illustrated in panel 2 of graph 3[15]. Once a TNC has to decide whether to develop a factory in country A or B, it is very likely that it votes for the less corrupt country to minimize political uncertainty. This is not contradicting the argument above that TNC activity may sustain corruption, because it refers to the way of TNC business after it is already operating in a country. However, the instrument might not be strong enough since the F-statistic of the first stage, as reported in regression (2) of table 6, is with 9.27 marginally below the conventional threshold.[16] Regarding the exclusion restriction, we suppose that the instrument exclusively drives income growth through the channel of institutions. One could argue that having a Nestlé factory in a country has positive impacts on economic growth on its own, which is true from a micro perspective but negligible from a macro perspective. Still there could be positive spillover effects to local firms. If the positive spillover effects are systematical, they should

[15] When regressing the Nestle factory dummy at the CPI the corresponding F-statistic is 34.53 and the p-value is zero, which speaks for a highly significant correlation.
[16] On behalf of testing for over-identification, the instrument is kept, but 2SLS estimations are conducted for the female share separately as well.

show up via a significant Nestlé dummy in the regressions of table 4, which is not the case. Though the instrument is not exogenous in a strict econometric sense, we argue that the actual influence on growth other than through institutions is negligible.

IV RESULTS

Table 6 shows the results of the 2SLS estimation compared to OLS (1).

TABLE 6
RESULTS OF OLS AND IV-2SLS ESTIMATION

	(1) OLS	(2) 2SLS: sh_fem and nestlef		(3) 2SLS: sh_fem	
		First Stage	Second Stage	First Stage	Second Stage
VARIABLES	g	CPI	g	CPI	g
CPI	0.282		0.278		0.344
	(2.22)**		(1.45)		(1.72)*
logrYpc_e	-1.438	1.176	-1.433	1.111	-1.533
	(4.63)***	(5.75)***	(3.93)***	(4.85)***	(4.28)***
logFtoN	0.578	0.272	0.579	0.224	0.564
	(8.92)***	(4.04)***	(7.32)***	(3.27)***	(7.26)***
gm4	0.002	-0.000	0.002	0.000	0.002
	(6.13)***	(0.32)	(6.23)***	(0.06)	(6.15)***
sh_fem		0.072		0.073	
		(4.43)***		(4.37)***	
nestlef		-0.718			
		(3.04)***			
F-test sh_fem=0		19.61		19.11	
p-value sh_fem=0		0.000		0.000	
F-test nestlef=0		9.27			
p-value nestlef=0		0.003			
_cons	11.739	-5.645	11.713	-5.518	12.231
	(5.65)***	(3.66)***	(5.18)***	(3.21)***	(5.63)***
R2	0.551	0.791	0.551	0.775	0.549
F	34.5	107.1	.	107.5	.
N	93	93	93	93	93

Notes: Robust t-statistics respective z-statistics (stage 2) in parentheses, *** significant at α = 0.01, ** significant at α = 0.05, * significant at α = 0.10, Testing for over-identification in (2) with the help of a Sargan test yields a non-significant test statistic (Score chi2 (1) = 0.493 with a p-value of 0.483) which supports the validity of the instruments.

While using both instruments enables to test for over-identification, the CPI is not even statistically significant at the 10 percent level (2). Due to the weak first stage of the Nestlé factory dummy, the CPI is only instrumented by the female share in parliament in (3). The CPI is now significant at the 10 percent level. While an improvement of the corruption index by 1 point increases the growth rate by 0.28 percentage points ceteris paribus

when applying OLS, the marginal effect increases to 0.34 percentage points when instrumented by the female share (3) ceteris paribus. Hence, the impact of corruption is by about one fifth larger when using 2SLS instead of OLS. Let us illustrate this argument by comparing Swaziland and Kenya. Both start with a very similar per capita income in 1970 and have similar capital intensity in the primary sector. Since Swaziland's CPI is with 3.20 by 1.1 points higher than Kenya's CPI of 2.10, referring to (3) one would expect Swaziland's growth rate to be [0.344 x 1.10 =] 0.38 percentage points higher than Kenya's.[17]

The marginal effect of the initial income level gets larger compared to previous estimations. If the initial income increases by 10 percent, the growth rate decreases by 0.14 percentage points in the OLS (1) and by 0.15 percentage points in the 2SLS (3) ceteris paribus, which constitutes an increase in the (negative) marginal effect of about 50% compared to regression (5) of table 4. This difference seems intuitive. When controlling for corruption, stronger convergence can be observed. The marginal effect of capital intensity in the primary sector is similar to the OLS regressions of table 4. Graph 6 in the appendix illustrates the remaining endogeneity problem.

CONCLUSION

The empirical results of this paper indicate correlation between income growth and TNC activity. However, severe endogeneity problems, particularly the reverse causality problem, hinder causal inference. Measuring TNC activity is often accompanied by a trade-off between feasibility and accuracy. Proxies like the fertilizer consumption may be too broad to be directly attributed to TNCs. Due to limited data availability, reasonable controls cannot be incorporated. For instance, data for corruption, fertilizer consumption, employment in agriculture, or TNC operations are hardly available before 2000. Still some stylized facts, especially regarding Sub-Sahara Africa, can be obtained. Unless controlling for numerous other variables, it critically depends on Sub-Sahara Africa if one observes convergence or not. When considering the 62 GATT members of 1970, significant divergence can be seen. When excluding Sub-Sahara Africa from the group significant convergence is observed. When controlling for other variables convergence of per capita income is visible. If GDP of 1970 increases by 10 percent, the growth rate decreases by up to 0.15 percentage points ceteris paribus. Despite of possible reverse causality concerns there is some evidence that countries that are in the WTO and never run trade disputes are far worse off. TNC proxies indicate positive effects on growth in the Siemens case, insignificant effects in the Nestlé case and negative effects in the fertilizer case. We argue that the oligopolistic structure of fertilizer supply due to the market power of TNCs is potentially harmful for growth in LDCs since high-priced fertilizers are not affordable for farmers in LDCs. Therefore, fertilizer consumption is somehow exemplary for LDCs being unable to get neces-

[17] In fact, Swaziland's annual average growth rate is with 3.3 percent distinctively higher than Kenya's 0.22 percent. However, the ceteris paribus condition is met in this example since the considered countries are very similar with respect to the other controls.

sary resources for development from the world market. In Sub-Sahara Africa, fertilizer consumption is 24-times lower than in South-East Asia. Combined with high employment in the primary sector of more than 60 percent of total employment the capital intensity is particularly low in Sub-Sahara Africa.

To deal with the reverse causality problem of the quality of institutions and income growth the corruption perception index, as a proxy for the quality of institutions, is instrumented by the female share in national parliaments and a Nestlé factory dummy. The female share is highly negatively correlated with corruption, suggesting that long-lasting elite structures are both male and corruptive. When instrumented by the female share an improvement of the CPI by 1 point increases the growth rate by 0.34 percentage points ceteris paribus. Furthermore, the analysis supports arguments of both the world system theory and Prebisch-Singer-hypothesis. Particularly the significant divergence within the GATT/WTO club indicates negative terms of trade for Sub-Sahara Africa. Additionally, all regressions show negative correlation between growth in primary sector exports and income growth. The same holds for consumption goods imports.

Since global trade is increasingly organized by TNCs rather than national states, development policies for LDCs should address TNC activity as well. Since there are strong arguments that TNCs follow little other goals than profit maximization, there is a need for policy intervention. Multinational bodies like the United Nations should call for stronger development policies that also integrate TNC regulation. Price regulation of crucial import goods such as fertilizers or rigorous punishment of TNCs that are involved in corruption cases could be exemplary. More pressure regarding transparency of TNC activity would not only decrease corruption but would also fertilize further research as data availability would improve. Then policymakers could refer to better analyses.

REFERENCES

Acemoglu, Daron, Simon Johnson, and James A. Robinson. "The Colonial Origins of Comparative Development: An Empirical Investigation" *The American Economic Review* 91, no. 5 (2001): 1369-1401.

Baumol, William J. "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show." *The American Economic Review* 78, no. 5 (1986): 1072–1085.

Besley, Timothy, and Torstein Persson. "The Logic of Political Violence." *The Quarterly Journal of Economics* 126, no. 3 (2011): 1411–1445.

Barro, Robert J. "Economic Growth in a Cross Section of Countries." *The Quarterly Journal of Economics* 106, no. 2 (1991): 407–443.

Cardoso, Fernando Henrique. *Development Under Fire.* Mexico: Instituto Latinoamericano de Estudios Transnacionales, 1979.

Cardoso, Fernando Henrique, and Enzo Faletto. *Dependency and Development in Latin America*. Berkeley: University of California Press, 1979.

Coca-Cola Company. *Per capita consumption of company beverage products. 2010 consumption snapshot.* http://www.coca-colacompany.com/content/dam/journey/us/en/private/fileassets/pdf/unknown/unknown/TCCC_2010_Annual_Review_Per_Capita_Consumption.pdf (accessed 1 May 2016).

DeLong, Bradford J. "Productivity Growth, Convergence, and Welfare: Comment." *The American Economic Review* 78, no. 5 (1988): 1138–1154.

El-Attar, Mayssun. "Trust, child care technology choice and female labor force participation." *Review of Economics of the Household* 11, no. 4 (2013): 507–544.

Encyclopaedia Britannica. *East India Company*. http://www.britannica.com/topic/East-India-Company (accessed 13 May 2016).

Forbes. *The World's Biggest Public Companies. 2015 Ranking.* http://www.forbes.com/global2000/list/#tab:overall (accessed 13 May 2016).

Frank, Andre Gunder. "Die Entwicklung der Unterentwicklung (1966)." In *Klassiker der Entwicklungstheorie. Von Modernisierung bis Post-Development,* edited by Karin Fischer, et al., 148–165. Vienna: Mandelbaum-Verlag, 2008.

General Electrics. *130 Countries are currently home to GE operations*. http://www.ge.com/directory (accessed 1 May 2016).

Gundlach, Erich, and Martin Paldam. "The transition of corruption: From poverty to honesty." *Economics Letters* 103, no. 3 (2009): 146–148.

Mauro, Paolo. "Corruption and Growth." *The Quarterly Journal of Economics* 110, no. 3 (1995): 681–712.

Nestlé, S.A. *Management Report 2000. Documents and Reports* (2001). http://www.Nestlé.com/asset-library/Documents/Library/Documents/Annual_Reports/2000-Management-Report-Brands-EN.pdf (accessed 19 April 2016).

Nestlé, S.A. *Annual Report 2010. Documents and Reports* (2011). http://www.Nestlé.com/asset-library/Documents/Library/Documents/Annual_Reports/2010-Annual-Report-EN.pdf (accessed 19 April 2016).

OECD. Organization for Economic Cooperation and Development. *Responsible Business Conduct. OECD Guidelines for Multinational Enterprises*. http://mneguidelines.oecd.org/ (accessed 21 January 2017).

Olsson, Ola, and Douglas Hibbs. "Biogeography and long-run economic development." *European Economic Review,* no. 49 (2005): 909–938 [Data appendix: http://douglas-hibbs.com/HibbsArticles/DEA.pdf (accessed 23 April 2016)].

Pettersson, Therése, and Peter Wallensteen. "Armed Conflicts, 1946-2014." *Journal of Peace Research* 52, no. 4 (2015): 536–550 [STATA file: http://www.pcr.uu.se/research/ucdp/datasets/ucdp_prio_armed_conflict_dataset/ (accessed 24 April 2016)].

Prebisch, Raúl. "Für eine bessere Zukunft der Entwicklungsländer (1964)." In *Klassiker der Entwicklungstheorie. Von Modernisierung bis Post-Development,* edited by Karin Fischer, et al., 131–145. Vienna: Mandelbaum-Verlag, 2008.

PWT. *International comparisons of production, income and prices.* Penn World Tables version 8.1 (2015), http://www.rug.nl/research/ggdc/data/pwt/pwt-8.1 (accessed 13 April 2016).

Siemens. *Worldwide presence* (2016). http://www.Siemens.com/about/en/worldwide.htm (accessed 1 May 2016).

Stock, J.H., and M. Yogo. "Testing for Weak Instruments in Linear IV Regression." In *Identification and Inference for Econometric Models Essays in Honor of Thomas Rothenberg*, edited by D.W.K. Andrews and J.H. Stock, 80–108. Cambridge: Cambridge University Press, 2005.

Sundberg, Ralph, Kristine Eck and Joakim Kreutz. "Introducing the UCDP Non-State Conflict Dataset." *Journal of Peace Research* 49, no. 2 (2012) 351–362. Data Appendix. http://www.pcr.uu.se/research/ucdp/datasets/ucdp_non-state_conflict_dataset_/ (accessed 24 April 2016)

Taylor, Robert C., and Diana L. Moss. *The Fertilizer Oligopoly: The Case for Global Antitrust Enforcement*. Washington/DC: The American Antitrust Institute, 2013, http://www.antitrustinstitute.org/sites/default/files/FertilizerMonograph.pdf (accessed 26 June 2016).

Tax Justice Network. *Financial Secrecy Index 2015*. http://www.financialsecrecyindex.com/introduction/fsi-2015-results (accessed 23 June 2016).

Transparency International. *Corruption Perception Index (CPI) 2000 and 2010 computed by Transparency International*. https://www.transparency.org/research/cpi/cpi_2000/0/ (accessed 28 June 2016).

Wallerstein, Immanuel. *World-Systems Analysis. An introduction.* Durham: Duke University Press, 2004.

World Bank Group. *Global Financial Development Database (GFDD)*, April 2013 (accessed 23 June 2016).

World Bank Group. *World Development Indicators (WDI)*, June 2016 (accessed 23 June 2016).

WTO. *Understanding the WTO: The Organization. Members and Observers: Trade Disputes* (2016). https://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm (accessed 21 April 2016).

WTO. *Dispute Settlement: Dispute DS306. India - Anti-Dumping Measure on Batteries from Bangladesh*. 24 February 2010. https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds306_e.htm (accessed 20 April 2016).

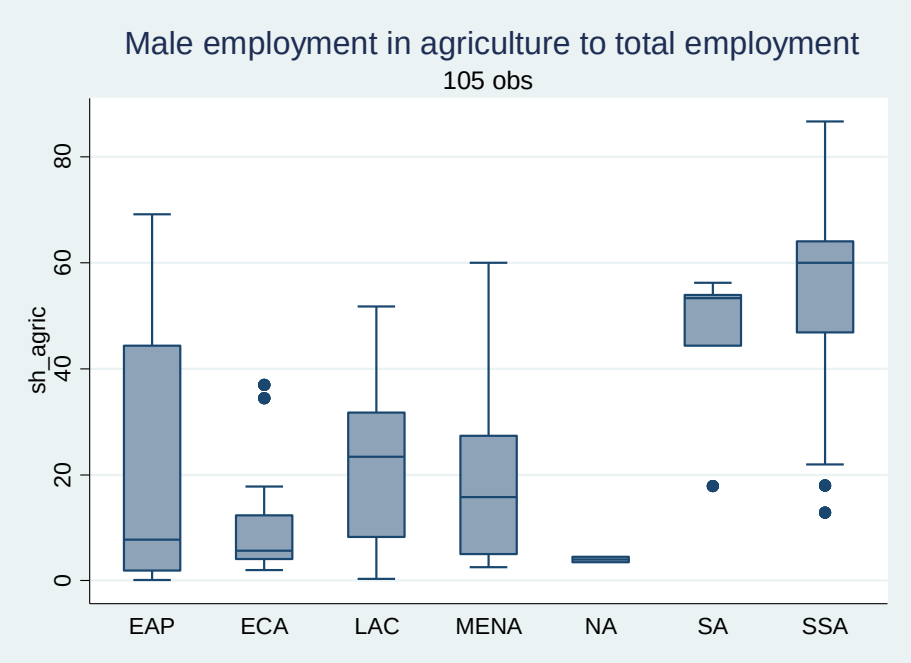
WTO. *World Trade Report 2013. Factors shaping the future of World trade*. Geneva: World Trade Organization, 2013.

Zhu, Boliang. "MNCs, Rents, and Corruption: Evidence from China." *American Journal of Political Science* 61, no. 1 (2017): 84–99.

APPENDIX

In the following graphs and descriptive statistics for the capital intensity in the primary sector, defined as the log of fertilizer consumption divided by male employment in agriculture, are provided.

GRAPH 4
EMPLOYMENT IN AGRICULTURE BY REGION



Notes: EAP: East Asia Pacific, ECA: Europe and Central Asia, LAC: Latin America and the Caribbean, MENA: Middle East and North Africa, NA: North America, SA: South Asia, SSA: Sub-Sahara Africa

Graph 4 plots male employment in agriculture for each region. In Sub-Sahara Africa, the mean share is with 55 percent almost 16 times larger than the 4 percent share in North America.

GRAPH 5
EMPLOYMENT IN AGRICULTURE, FERTILIZER CONSUMPTION AND GDP

As can be seen in the first panel of graph 5, the correlation of employment in agriculture and fertilizer consumption is strong (rho = -0.69) and negative. The two input factors of the primary sector seem to have subsidiary character. Panel 2 illustrates the strong (rho = -0.87) and negative correlation of employment in agriculture and GDP level as of 2000.

TABLE 7
FERTILIZER CONSUMPTION PER HECTARE OF ARABLE LAND

Region	Mean	Std. Dev.	Observations
EAP	1540	3394	11
exclusive SGP[18]	*537*	*715*	*10*
ECA	203	113	24
LAC	147	184	21
MENA	268	357	7
NA	89	43	2
SA	77	66	5
SSA	22	53	31
World	277	1172	101
exclusive SGP	*164*	*295*	*100*

Notes: In kilograms per hectare of arable land. Uncovered countries from SSA are estimated by the mean of SSA

The magnitude of fertilizer consumption differs substantially across regions. The range is as big as of factor 24, or even 70 when including Singapore. Countries of East Asia Pacific use 24 respective 70 times more fertilizers per hectare than countries of Sub-Sahara Africa on average.[19]

Panel Data

Table 8 documents the descriptive statistic of the dependent variable, the average annual growth rate, for each decennial.

TABLE 8
AVERAGE ANNUAL GROWTH RATES

Period	Mean	Std. Dev.	Obs.
1970 - 1980	2.4302988	3.1790221	108
1980 - 1990	1.6739104	2.9864883	108
1990 - 2000	2.2718284	2.5974816	108
2000 - 2010	2.4119754	2.4300725	108
Total	2.1970032	2.8212457	432

It is important to point out the endogeneity problem of investigating sources for income growth. Inference is only correct when the error term is uncorrelated with the dependent variable. Since the error term is unobservable, we can only analyze the residuals. We clearly see that the residuals are correlated with the growth rate. While specifications that are more sophisticated can

[18] Since Singapore has an extraordinary high fertilizer consumption of 11,567 kg/hectare it seems reasonable to consider it separately.
[19] That is the reason why a log scale is of great help here. For the analysis, the natural logarithm of the ratio of fertilizer consumption to the share of male employment in agriculture is taken.

mitigate the problem to some extent, as the comparison to the simple Baumol set-up shows, the correlation between the residuals and growth is still large in the other three panels.

GRAPH 6
REMAINING ENDOGENEITY PROBLEM