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Trade Patterns and Endogenous Institutions: Global Evidence

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Trade patterns and the Rule of Law

What this is about

Rule of Law, Rule-of-Law intensity, and patterns of trade

Contribution

Data

Estimation strategies

Results

Conclusions

World Bank Governance Indicators: "Rule of law captures 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."

We observe: countries with better Rule of Law export more *Rule-of-Law intensive* goods.

Rule-of-Law intensity is described by product(ion) complexity, and proxied by

- input concentration (Levchenko, 2007),
- share of user-specified inputs (Nunn, 2007),
- job complexity (Costinot, 2009),
- all three (Chor, 2010).

Theoretical motivation is based on effects of specialization-specific, open economy rent seeking on institutional design.

In a complex production relationship, investment is specific to particular relationship: i.e., its value is higher within than outside the relationship.

With irreversible investment, this difference constitutes an appropriable quasi-rent: as long as contractual claims are incomplete(ly enforceable), the investor might have to (re-)negotiate *ex post* with the owners of other factors of production (Williamson, 1985; Grossman and Hart, 1986; Hart and Moore, 1990).

This *hold-up problem* results in both investment inefficiency and rents for non-investors.

High enforceability of contracts (good Rule of Law) lessens investment inefficiency and rents and generates comparative advantage in complex production processes: countries with better Rule of Law export more *Rule-of-Law intensive* goods.

Reversing causality: non-investors use rents to lobby for some specific Rule of Law quality.

Opening the economy: non-investors lobby for better Rule of Law with partial loss of rents, to avoid losing all rents to foreign producers working under better Rule of Law.

Hence, countries with (Rule-of-Law independent) higher propensities to export Rule-of-Law intensive goods have better Rule of Law (Levchenko, 2013).

Investment specificity and irreversibility create hold-up problems throughout the economy.

The prime example concerns capital-labor relationships, enabling labor to earn rents and decrease investment below the efficient level, to be alleviated by effective labor market deregulation.

Caballero et al. (2013) emphasize distinction between *official* and *effective* labor market deregulation, measuring effective labor regulation by interacting official measures of job security provision with Rule of Law.

Opening the economy to international competition leaves labor the choice to either lobby for some lower degree of official labor market regulation or for some higher quality of the Rule of Law, with partial loss of rents, to avoid losing all rents to foreign producers working under less effective labor regulation.

However, there are sources of rents other than hold-up problems in complex production processes or capital-labor relationships.

A number of contributions argue that natural-resource dependence is responsible for low institutional quality (Auty, 1994; Bhattacharyya and Hodler, 2010; Gylfason, 2001; Hoff and Stiglitz, 2004; Sachs and Warner, 1995).

This suggests specialization-specific channels for open economy rent seeking to impact on institutional design:

- an economy-wide channel of labor seeking appropriable quasi-rents accruing from hold-up problems in capital-labor relationships,
- an additional channel of non-investors seeking appropriable quasi-rents accruing from hold-up problems in complex production processes with incomplete contracts, and
- another channel of rent seeking from primary production.

Interdependence between trade patterns and Rule of Law may then be examined in the light of different categories of goods.

- Relative to all other goods, we expect specialization on complex goods ((here: fragmented goods, i.e., parts, components and final products of capital goods and transport equipment) to *cet. par.* positively affect the Rule of Law;
- Relative to all other goods, we expect specialization on primary goods to *cet. par.* negatively impact on the Rule of Law.

Trade patterns and the Rule of Law

Contribution

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(1) We propose a novel way to measure the institutional intensity of exports at the product level
- based on 1.4 billion disaggregated global bilateral trade flows;
- independent from any specialization-specific channel for open economy rent seeking

(2) We generalize Levchenko's (2013) result – that countries exporting more RoL-intensive goods exhibit a better RoL – to our trade-based measures of RoL intensity.

(3) We attempt to identify sectors responsible for positive (negative) impact on the RoL.
- We identify complex production processes as resulting from *fragmentation* (growing division of labor), especially observed in the production of capital goods and transport equipment, generating parts, components, and respective final goods.
- We find that trade flows generated by (fragmented and) other processes of production improve the Rule of Law, while trade flows generated by primary production do not.

Trade patterns and the Rule of Law
Data

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Bilateral trade flows

We use CEPII's BACI trade data-set, derived from UN-Comtrade: bilateral trade flows in HS Code 92, at the 6-digit level (5,017 goods) for 1995–2010 for almost 200 countries (i.e., 1.4 bn. bilateral trade flows).

Bilateral proxies for trade costs

We use unilateral and bilateral CEPII data to proxy trade costs, mainly on geography (area, distance, common border, landlocked, population).

Country-specific data: institutional indicators and control variables

RoL indicator from the Worldbank Quality of Governance database (see Teorell et al., 2013)
GDP per capita and population data from PWT 8.0 (2014)
Trade liberalization information from Wacziarg and Welch (2008)
Legal tradition information from LaPorta et al. (1998)
Political regime data from Polity4 database (hierarchy of institutions hypothesis), see Marshall et al. (2011)

Trade patterns and the Rule of Law

Estimation strategies

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To identify the influence of trade patterns on institutions, endogeneity has to be dealt with. Levchenko (2013) does this *via* a two-step approach.

(i) Construct a country-specific measure of RoL-intensive exports ("institutionally intensive trade") that combines geographically pre-determined information on trade flows with Nunn's (2007) ISIC-industry-specific measures of the complexity, and thus RoL intensity, of production.

(ii) Regress RoL quality on constructed measures of RoL intensive exports and controls.

We follow this general approach using, however, three different estimations strategies:

A. Levchenko (2013), but substituting Nunn's (2007) ISIC-specific complexity measures by trade-based product-specific RoL intensity measurement (Hausman et al., 2007)

B. As in A, however constructing three country-specific measures of RoL intensity of exports for primary, fragmented and other goods categories, respectively.

C. We account for RoL variation only by countries' geographically pre-determined export shares in goods categories (primary, fragmented, and other goods).

Trade patterns and the Rule of Law

Estimation strategy A

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Account for observed variation in country-specific RoL by country-specific RoL intensity of exports and controls,

$$RoL_i = \alpha + \beta RoLIX_i + \gamma Z_i + \epsilon_i \qquad (1)$$

Country-specific RoL intensity of exports is constructed by interacting country-specific (*i*) with product-specific (*k*) information,

$$RoLIX_i = \sum_{k=1}^{K} \hat{X}_{ik} \cdot RoLIX_k \qquad (2)$$

where $RoLIX_k$ denotes RoL intensity of good *k*, and $\hat{X}_{ik}$ is predicted country *i* export share of good *k*.

We predict $\hat{X}_{ik}$ as in Frankel and Romer (1999): first regress all bilateral export relationships $\hat{X}_{ijk}$ on uni- and bilateral geographical information only. Then, aggregate according to $\widehat{X}_{ik}=\sum_{j\neq i} e^{\ln \hat{X}_{ijk}}$.

Levchenko (2013) uses Nunn's (2007) measure of $RoLIX_k$ based on Rauch's (1998) product classification,

> "… defined as the fraction of each industry's inputs not sold on organized exchanges or reference priced and is constructed based on US Input-Output Tables."

We measure RoL intensity of good *k* as average global RoL requirement to export *k*,

$$RoLIX_k = \sum_i \underbrace{\left(\frac{X_{ik}/X_i}{\sum_i X_{ik}/X_i} \right)}_{\varphi_{ik}} \cdot RoL_i \qquad (3)$$

with $X_i = \sum_k X_{ik}$ and weights φ_{ik} denoting a variant of Balassa's RCA to ensure that ordering of products is not biased by country size.

Therefore, our $RoLIX_k$ measure:

- is not based on technology information from only one country;
- captures more industries, especially in primary production;
- is based on much more disaggregated information (trade data, HS 6-digit level, 5,017 goods);
- renders RoL intensity measurement independent from specialization-specific channels for open economy rent seeking (e.g., hold-up problems in complex production processes with incomplete contracts).

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Estimation strategy A

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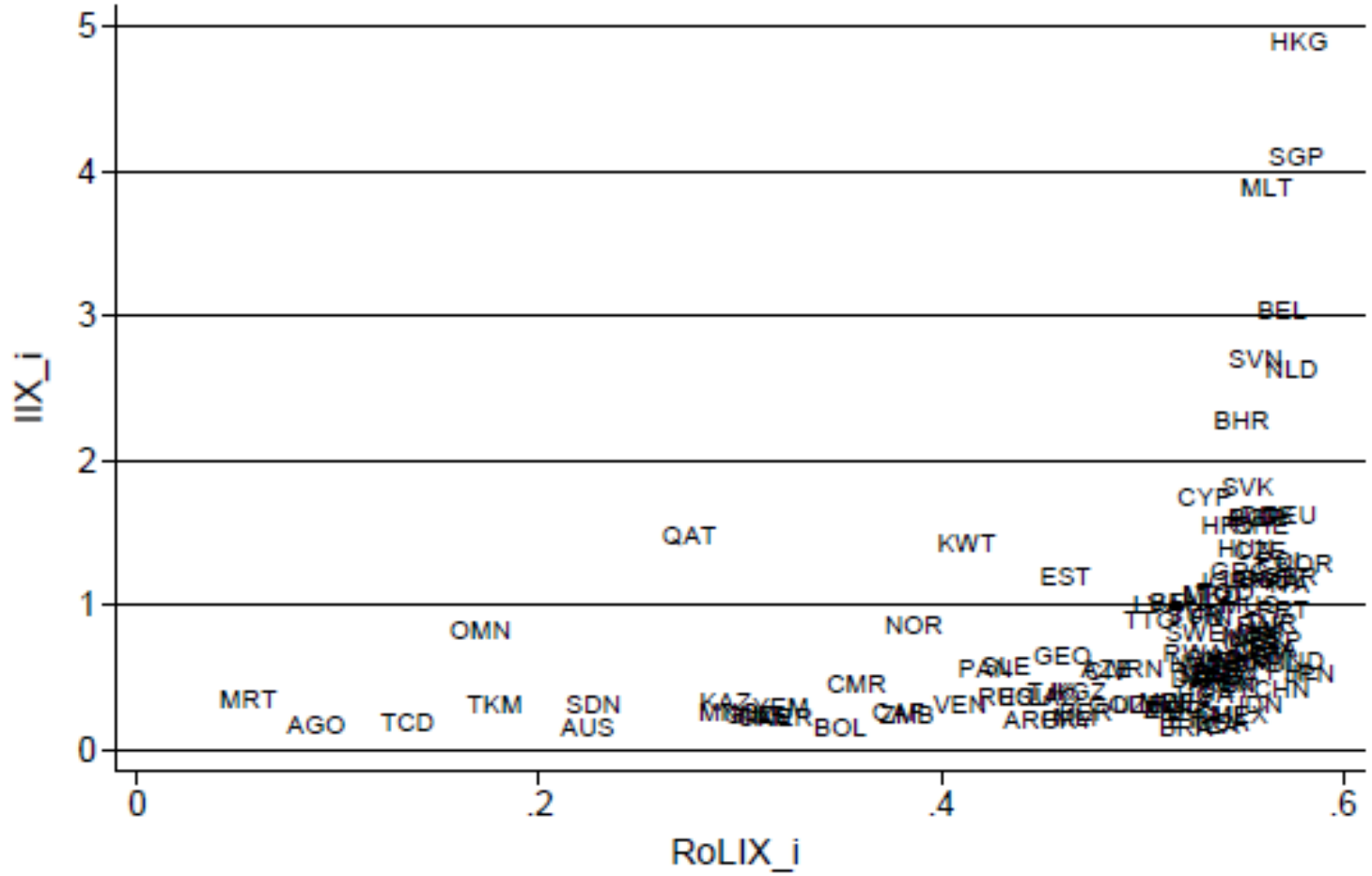

Levchenko's (2013) country-specific measure of RoL-intensive exports ("institutionally intensive trade", IIX) *versus* our $RoLIX_i$

Trade patterns and the Rule of Law

Estimation strategy A: Results

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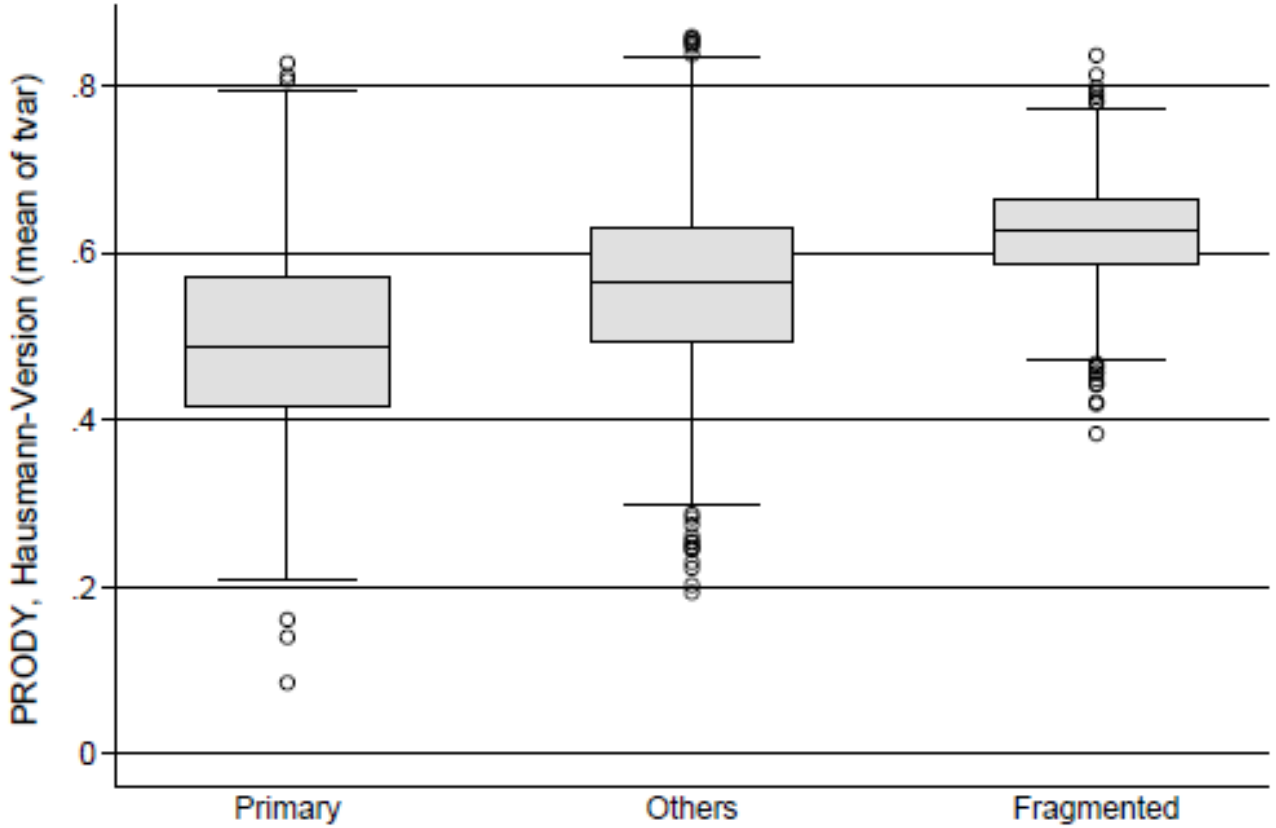
	1	2	3	4	5	6
$RoLIX_i$	0.381*** (0.109)				0.267** (0.134)	0.336** (0.142)
$RoLIX_i$ (weight 2)		0.005*** (0.001)				
$RoLIX_i$ *			0.381*** (0.113)			
$RoLIX_i$ * (weight 2)				0.005*** (0.001)		
ln openc	0.004	-0.017	0.004	-0.017	-0.003	0.001
legor fr	-0.077***	-0.071***	-0.076***	-0.079***	-0.080***	-0.092***
legor ge	0.058*	0.058**	0.059*	0.059**	0.045	0.031
legor sc	0.092***	0.041	0.095**	0.044	0.098***	0.084**
legor so	-0.128***	-0.127***	-0.127***	-0.126***	-0.125***	-0.144***
ln gdppc	0.108***	0.083***	0.109***	0.083***	0.101***	0.095***
ln area	0.014	0.003	0.013	0.003	0.010	0.008
ln population	-0.029***	-0.003	-0.027***	-0.002	-0.025*	-0.027*
Liberalization						0.033
Polity2					0.005***	0.004*
Constant	-0.689***	-0.171	-0.659***	-0.174	-0.528**	-0.465**
Observations	144	144	144	144	128	115
Adjusted R-squared	0.73	0.76	0.73	0.76	0.73	0.74

Note: All estimations with robust standard errors (partly shown); *** $p<0.01$, ** $p<0.05$, * $p<0.1$

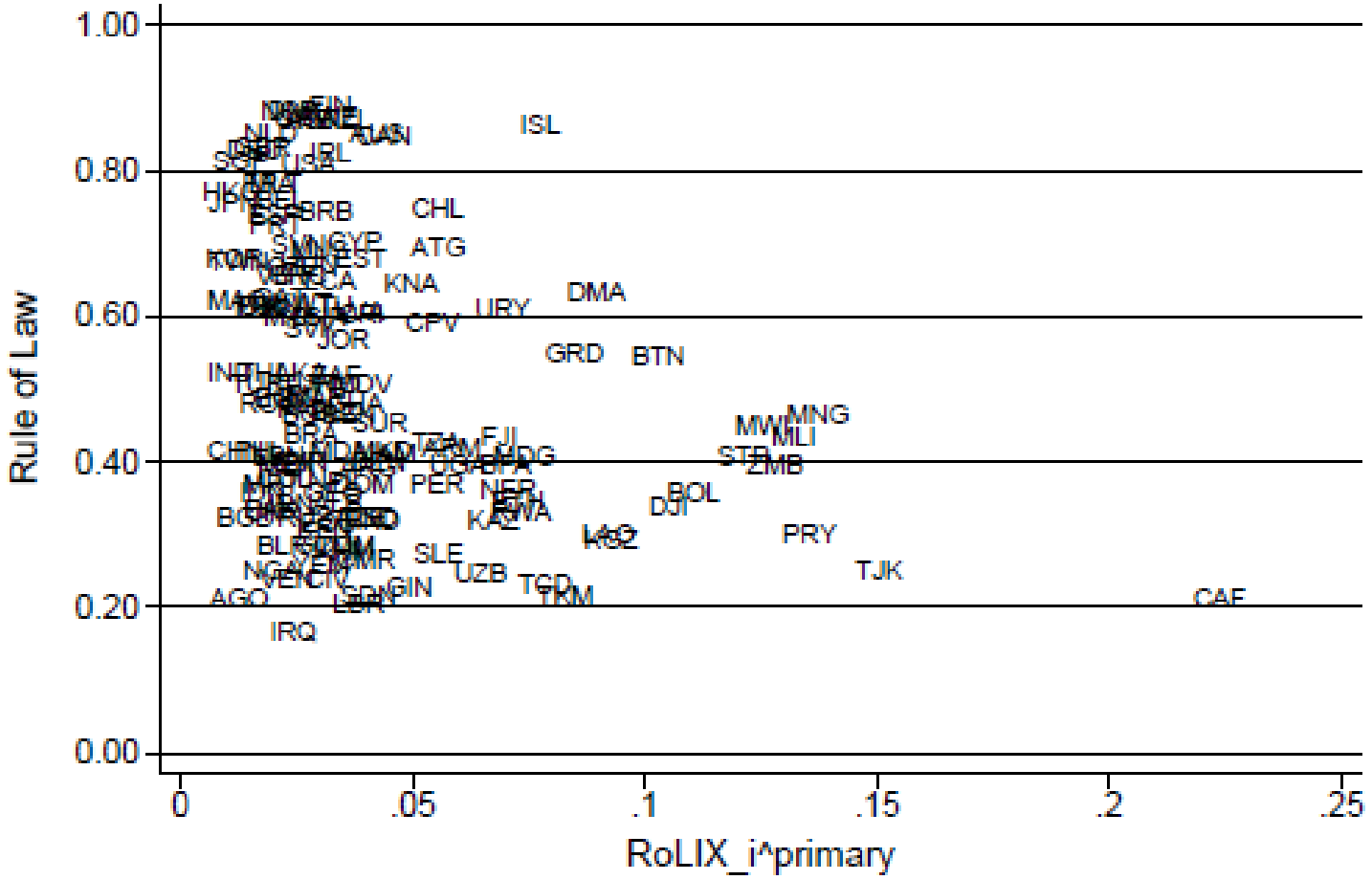


Rule of Law intensities for different goods categories (BEC)

Notes: Fragmented: parts, components and final capital goods and transport equipment, i.e., BEC headings 41, 42, 51, 521, 522, 53; Primary: BEC headings 111, 21; Other: BEC headings 112, 121, 122, 22, 61, 62, 63.

Trade patterns and the Rule of Law

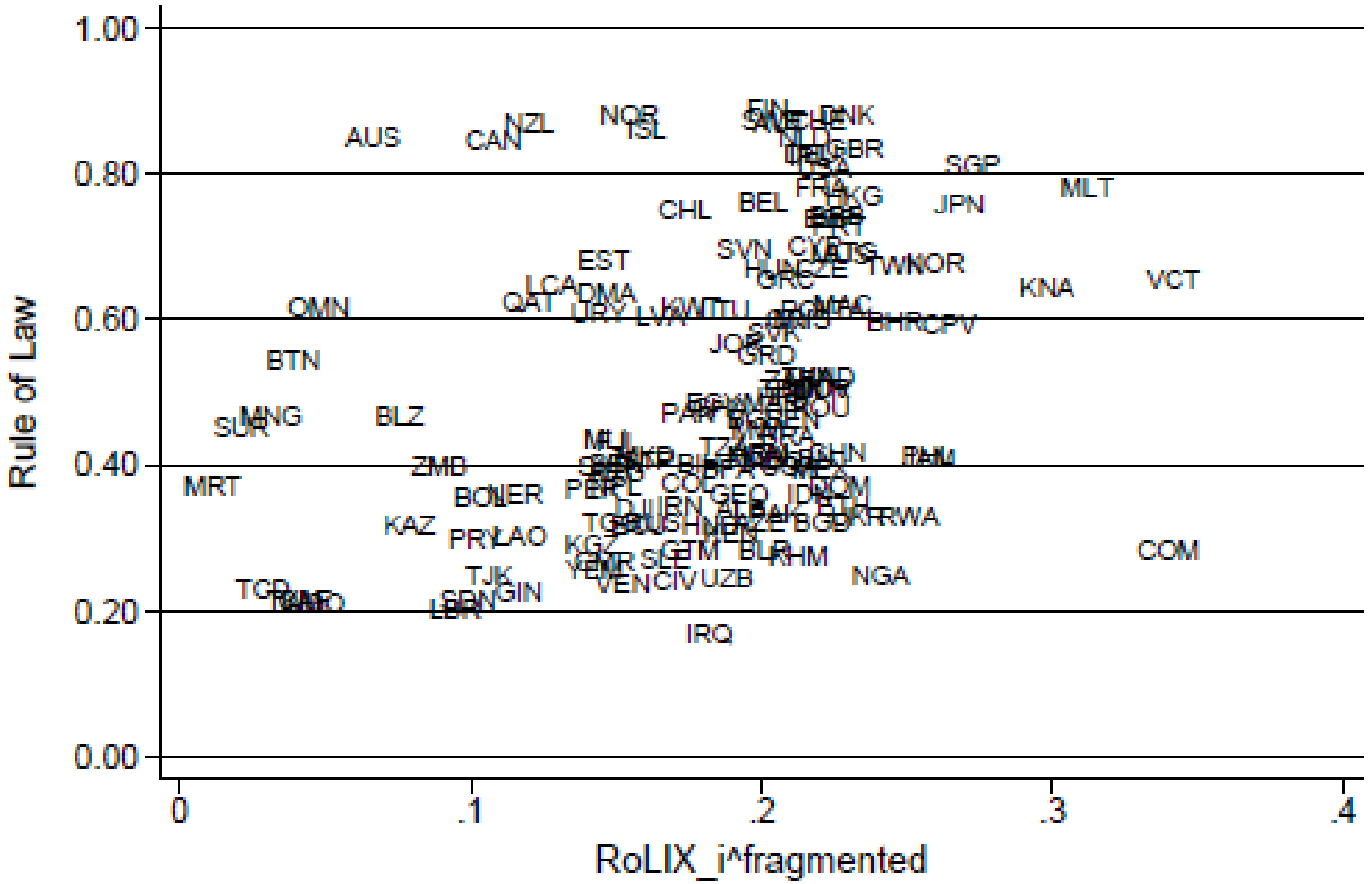
Estimation strategy B: Rule of Law intensities



Relationship between $RoLIX_i^c$ and Rule of Law

Trade patterns and the Rule of Law

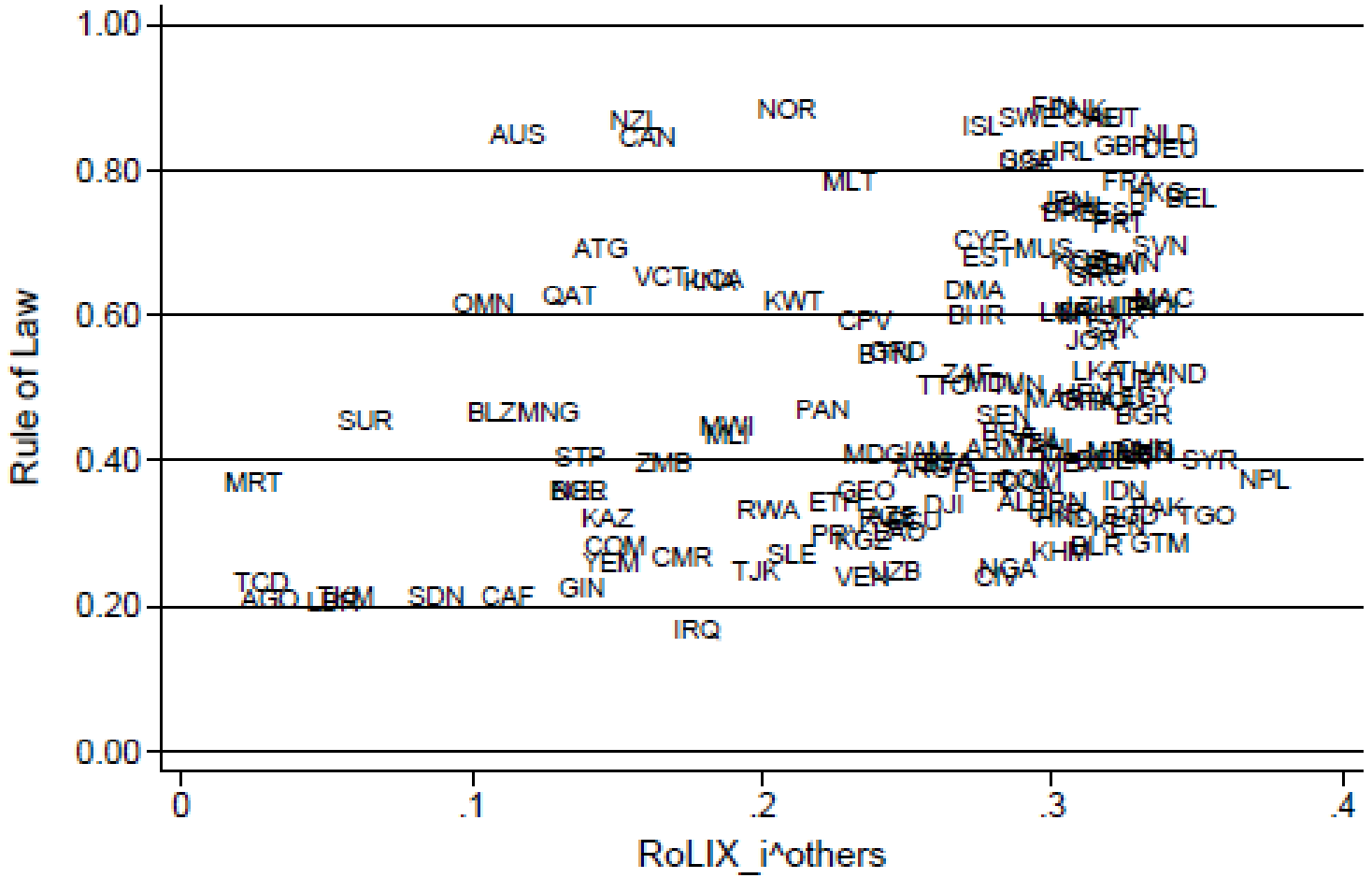
Estimation strategy B: Rule of Law intensities



Relationship between $RoLIX_i^c$ and Rule of Law

Trade patterns and the Rule of Law

Estimation strategy B: Rule of Law intensities



Relationship between $RoLIX_i^c$ and Rule of Law

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Estimation strategy B: Results

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	7	8	9	10
$RoLIX_i$ (primary)	0.28 (0.32)	-1.44*** (0.35)	0.15 (0.35)	0.14 (0.34)
$RoLIX_i$ (fragmented)	0.49** (0.21)	0.36 (0.32)	0.21 (0.32)	0.55 (0.39)
$RoLIX_i$ (other)	0.35** (0.15)	0.76*** (0.22)	0.31* (0.17)	0.28 (0.20)
ln openc	0.01		0.00	0.00
legor fr	-0.08***	-0.08**	-0.08***	-0.09***
legor ge	0.06*	0.22***	0.05	0.03
legor sc	0.079**	0.24***	0.10***	0.08***
legor so	-0.13***	-0.13***	-0.13***	-0.14***
ln gdppc	0.11***		0.10***	0.09***
ln area	0.02**	0.03	0.01	0.01
ln pop	-0.03***	-0.06***	-0.03	-0.04*
Liberalization				0.03
Polity2			0.01***	0.01*
Constant	-0.71***	0.17	-0.52**	-0.53**
Observations	144	144	128	116
Adjusted R-squared	0.73	0.43	0.73	0.74

Note: All estimations with robust standard errors (partly shown); *** p<0.01, ** p<0.05, * p<0.1

Trade patterns and the Rule of Law

Estimation strategy C: Results

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	11	12	13	14
Export share primary	-0.18**	-0.37***	-0.15	-0.13
	(0.08)	(0.12)	(0.10)	(0.11)
Export share fragmented	0.07	-0.09	-0.05	0.20
	(0.14)	(0.25)	(0.22)	(0.29)
ln openc	0.01		0.00	0.00
legor fr	-0.08***	-0.08*	-0.08***	-0.09***
legor ge	0.06*	0.23***	0.05	0.04
legor sc	0.10***	0.29***	0.10***	0.08**
legor so	-0.12***	-0.12***	-0.12***	-0.14***
ln gdppc	0.11***		0.10***	0.09***
ln area	0.02*	0.01	0.01	0.01
ln pop	-0.03***	-0.04**	-0.02	-0.03*
Liberalization				0.03
Polity2			0.01***	0.01***
Constant	-0.47***	0.61***	-0.32	-0.37
Observations	144	144	128	115
Adjusted R-squared	0.73	0.37	0.73	0.74

Note: All estimations with robust standard errors (partly shown); *** p<0.01, ** p<0.05, * p<0.1

Trade patterns and the Rule of Law

Conclusions

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Theoretical models, in which institutions both create rents and shape comparative advantage, allow for testable hypotheses on the influence of trade patterns on institutions.

In this paper, we test hypotheses against the background of institutional variation across countries and by operationalizing trade patterns as different goods categories by use.

First, our results confirm Levchenko (2013) in that countries exporting more Rule-of-Law intensive goods exhibit a higher quality of the Rule of Law.

We also find that political institutions, legal origin, and level of technology (economic development) matter.

Using highly disaggregated global product level data, differentiating trade flows on the use side, we go beyond previous results in identifying sectors responsible for the impact of specialization on Rule of Law.

Our results suggest trade flows generated by other processes of production improve the Rule of Law, while trade flows generated by primary production do not.

Our results do not robustly confirm the prior of a special effect from specialization and trade in fragmented goods on the quality of the Rule of Law.

In consequence, our results motivate qualifications to incomplete contracts foundation of trade theory explanations to why we observe differences in legal institutional quality across countries.

Trade patterns and the Rule of Law

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Trade patterns and the Rule of Law

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– More slides –

More notes: $\hat{X}_{ik}$ and $RoLIX_k$, and therefore $RoLIX_i$, are all time-independent. In the benchmark version this is (as in Hausman et al., 2007) achieved by first calculating yearly measures of $\hat{X}_{ik}$ and $RoLIX_k$, and then taking means over time, to finally compute $RoLIX_i$.

In a second version (denoted by $RoLIX_i^*$), we take averages of all trade flows over time already before calculating $\hat{X}_{ik}$ and $RoLIX_k$.

Weighting scheme 1 (benchmark) refers to geographical predetermination à la Frankel and Romer (1999) of $\hat{X}_{ik}$ as predicted country *i* export share of good *k*.

In weighting scheme 2, we instead predetermine total exports of country *i* in good *k*.

openc and gdppc are initial values, as of 1995.

Trade patterns and the Rule of Law

Estimation strategy B: Rule of Law intensities

1 Food and beverages	4 Capital goods (except transport equipment) and parts and accessories thereof
11 Primary	41 Capital goods (except transport equipment)
111 Mainly for industry	42 Parts and accessories
112 Mainly for household consumption	5 Transport equipment and parts and accessories thereof
12 Processed	51 Passenger motor cars
121 Mainly for industry	52 Other
122 Mainly for household consumption	521 Industrial
2 Industrial supplies not elsewhere specified	522 Non-industrial
21 Primary	53 Parts and accessories
22 Processed	6 Consumer goods not elsewhere specified
3 Fuels and lubricants	61 Durable
31 Primary	62 Semi-durable
32 Processed	63 Non-durable
321 Motor spirit	7 Goods not elsewhere specified
322 Other	

Broad Economic Categories (BEC)

The United Nations Statistics Division's Classification by BEC (Broad Economic Categories, available online at http://unstats.un.org/unsd/cr/family2.asp?Cl=10) allows for headings of HS or SITC, Rev.3 to be grouped into 19 activities. The BEC also provides for the rearrangement of these 19 activities (on the basis of categories' main end-use) to approximate the basic System of National Accounts (SNA) activities: primary, intermediate, capital, and consumer goods.

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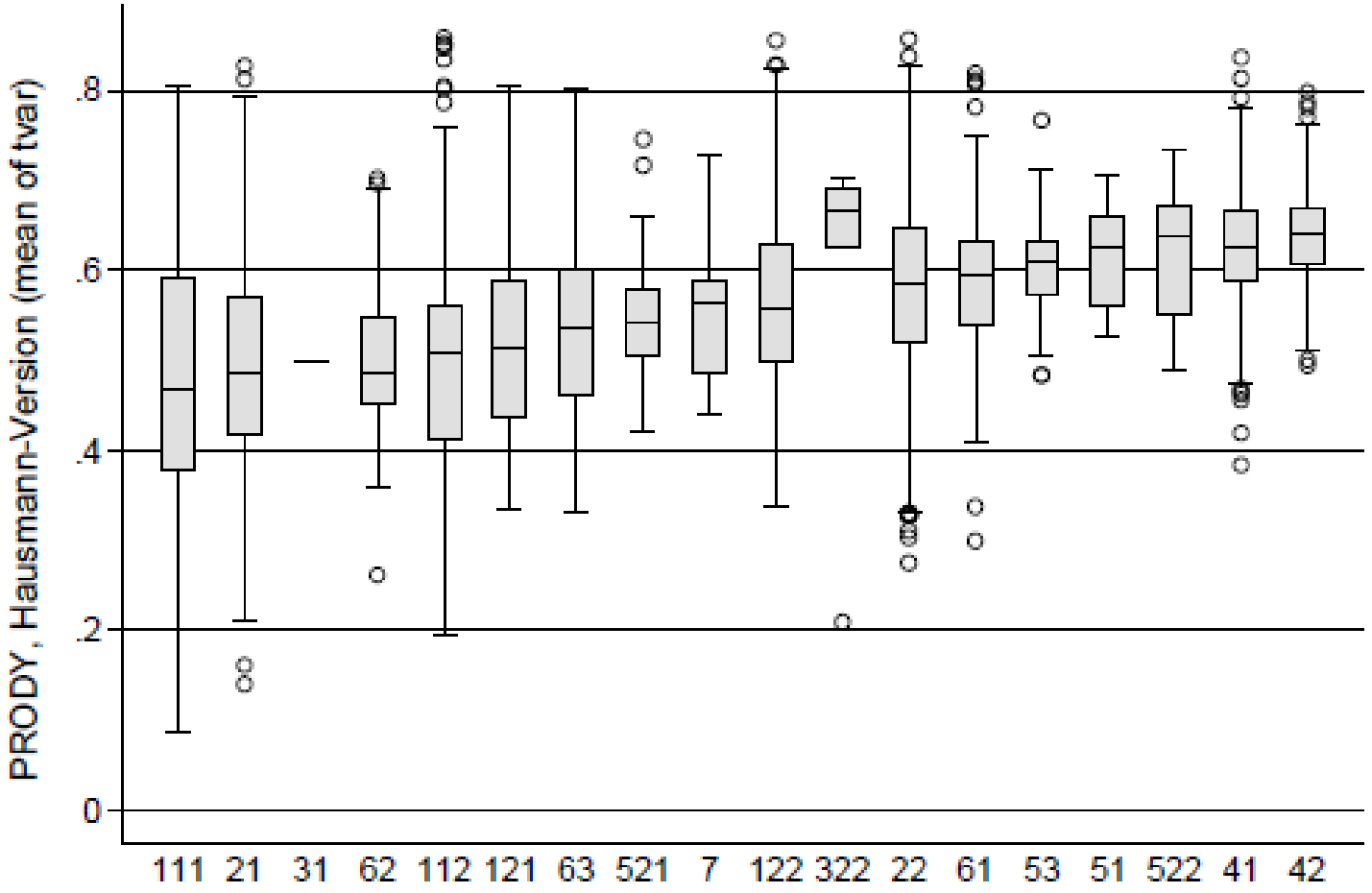

Rule of Law intensities for different activities (BEC)

Trade patterns and the Rule of Law

Estimation strategy A

Nunn (2007) constructs $RoLIX_k$ with the help of US input-output tables, based on Rauch's (1998) product classification. This measure is also applied in Levchenko (2012, p. 1164):

"It is defined as the fraction of each industry's inputs not sold on organized exchanges or reference priced and is constructed based on US Input-Output Tables. The idea behind this measure is that inputs sold in spot markets-those that can be obtained on organized exchanges, for instance-do not require contracts and thus good institutions. However, inputs that cannot be bought this way require relationship-specific investments and thus rely on good contracting institutions being in place. The higher the fraction of such inputs in an industry, the higher is its "institutional intensity."

However, this method may suffer from limitations:

- First, it is based on technology information from only one country (US input-output tables).
- Second, some industries are not captured (see table below).
- Third, the level of (dis-)aggregation is tied to the ISIC level: trade data are usually not reported at the ISIC-level requiring conversions from HS and SITC classifications which are far from perfect.
- Fourth, it renders RoL intensity measurement dependent from one specialization-specific channel for open economy rent seeking: hold-up problems in complex production processes with incomplete contracts.

We measure RoL intensity of good *k* as average global RoL requirement to export *k*,

$$RoLIX_k = \sum_i \underbrace{\left(\frac{X_{ik}/X_i}{\sum_i X_{ik}/X_i} \right)}_{\varphi_{ik}} \cdot RoL_i \qquad (3)$$

with $X_i = \sum_k X_{ik}$ and weights φ_{ik} denoting a variant of Balassa's RCA to ensure that the ordering of the products is not biased by country size.

To compare Nunn/Levchenko $RoLIX_k$ and $RoLIX_i$ measures with ours, we calculate ours at ISIC level. As our trade data are both much more disaggregated and cover more ISIC industries, there are four ways to do so:

(1) We aggregate trade data to ISIC and calculate $\hat{X}_{ik}$ and $RoLIX_k$ with *k* representing ISIC level.

(2) As (1), but we consider only ISIC industries also covered by Nunn/Levchenko.

(3) Two step procedure:

a) calculate both $\hat{X}_{ik}$ and $RoLIX_k$ with *k* representing HS 6-digit level.

b) Aggregate resulting $\hat{X}_{ik}$ and $RoLIX_k$ up to ISIC level.

(4) As (3), but we consider only ISIC industries also covered by Nunn/Levchenko.

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Robustness

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- Exclude countries below $2,000 GDP per capita from the sample, as data quality in least developed countries may be an issue;
- exclude oil exporting countries (with more than 50% of total exports in HS-category 27, mineral fuels etc.) from the sample to check whether oil exporters represent an outlier group;
- vary the definition of product groups (primary, fragmented, other).
- Finally, we bootstrapped all standard errors (instead of computing robust standard errors). Results remained remarkably unchanged and are available upon request.

Trade patterns and the Rule of Law

Robustness: no poor

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	15	16	17
$RoLIX_i$	0.535***		
	(0.130)		
$RoLIX_i$ (primary)		0.236	
		(0.434)	
$RoLIX_i$ (fragmented)		0.517*	
		(0.283)	
$RoLIX_i$ (other)		0.574***	
		(0.182)	
Export share primary			-0.316***
			(0.101)
Export share fragmented			-0.028
			(0.179)
ln openc	0.027	0.028	0.028
legor fr	-0.090***	-0.091***	-0.090***
legor ge	0.013	0.015	0.020
legor sc	0.022	0.019	0.027
legor so	-0.144***	-0.145***	-0.143***
ln gdppc	0.148***	0.145***	0.145***
ln area	0.026**	0.029**	0.028**
ln pop	-0.038***	-0.043***	-0.042***
Constant	-1.345***	-1.342***	-1.009***
Observations	112	112	112
Adjusted R-squared	0.75	0.75	0.74

Trade patterns and the Rule of Law

Robustness: no oil

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	18	19	20
$RoLIX_i$	0.196*		
	(0.113)		
$RoLIX_i$ (primary)		0.365	
		(0.322)	
$RoLIX_i$ (fragmented)		0.492**	
		(0.201)	
$RoLIX_i$ (other)		0.020	
		(0.146)	
Export share primary			0.012
			(0.080)
Export share fragmented			0.233*
			(0.126)
ln openc	0.013	0.021	0.018
legor fr	-0.067***	-0.066***	-0.064***
legor ge	0.035	0.031	0.037
legor sc	0.078***	0.074***	0.085***
legor so	-0.138***	-0.135***	-0.130***
ln gdppc	0.117***	0.120***	0.117***
ln area	0.013*	0.017**	0.015*
ln pop	-0.021**	-0.021**	-0.020**
Constant	-0.709***	-0.822***	-0.730***
Observations	126	126	126
Adjusted R-squared	0.77	0.77	0.76

Trade patterns and the Rule of Law

Robustness: Definition of product groups

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	21	22
$RoLIX_i$ (primary)	0.10	
	(0.34)	
$RoLIX_i$ (fragmented)	0.47**	
	(0.20)	
$RoLIX_i$ (other)	-0.33	
	(0.55)	
Export share primary		0.22
		(0.30)
Export share fragmented		0.46
		(0.37)
ln openc	0.00	0.00
legor fr	-0.08***	-0.08***
legor ge	0.04	0.04
legor sc	0.08**	0.08***
legor so	-0.13***	-0.13***
ln gdppc	0.09***	0.09***
ln area	0.02	0.02*
ln pop	-0.04*	-0.04**
Polity2	0.01***	0.01***
Constant	-0.58***	-0.74**
Observations	128	128
Adjusted R-squared	0.73	0.73

Note: Fragmented: capital goods and passenger motor cars and parts, components thereof plus durable consumer goods, i.e., BEC headings 41, 42, 51, 53; 61; Primary: BEC 111, 21; Other: BEC 112, 121, 122, 22, 521, 522, 62, 63.

Note: All estimations with robust standard errors (partly shown); *** p<0.01, ** p<0.05, * p<0.1