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Does Export Concentration Cause Volatility?

Christian Busch

14. Januar 2010

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Overview

- Countries with undiversified export structure are plausibly more vulnerable to external shocks.
- But difficult to evaluate “causal” influence of export concentration on external volatility (exchange rate, terms of trade, export growth)
- Use of a new instrument that is based entirely on geographic characteristics, and thus plausibly uncorrelated with other determinants, including institutions, income, and policies.
- Causal effect found for terms of trade and export growth, but not for exchange rates.

Introduction

- Large variation in volatility of macroeconomic aggregates (output, exports, exchange rates, terms of trade etc.) across countries

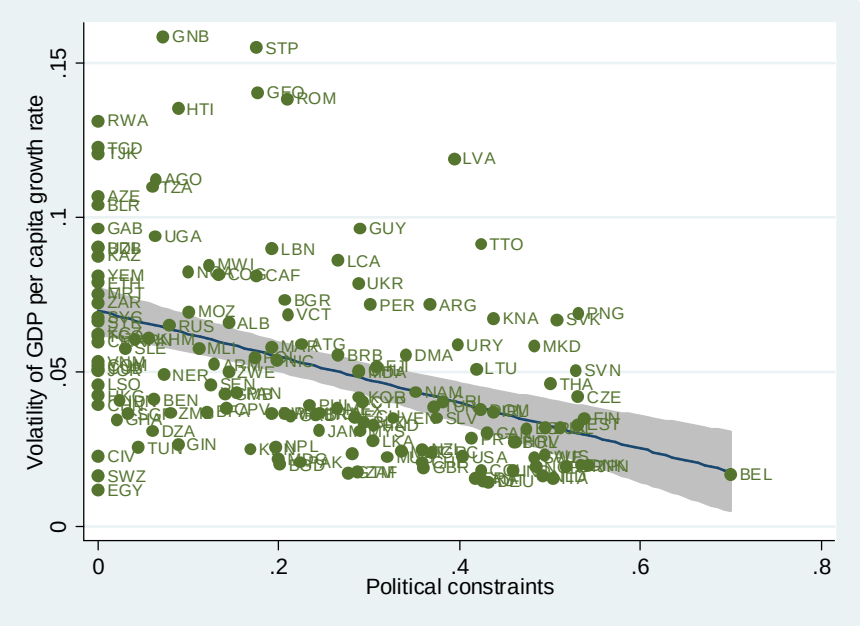
- Volatility decreases with level of development
  - Lack of access to financial markets to mitigate external risks
  - External shocks can be amplified by weak institutional environment (Rodrik, 1999, JEG)

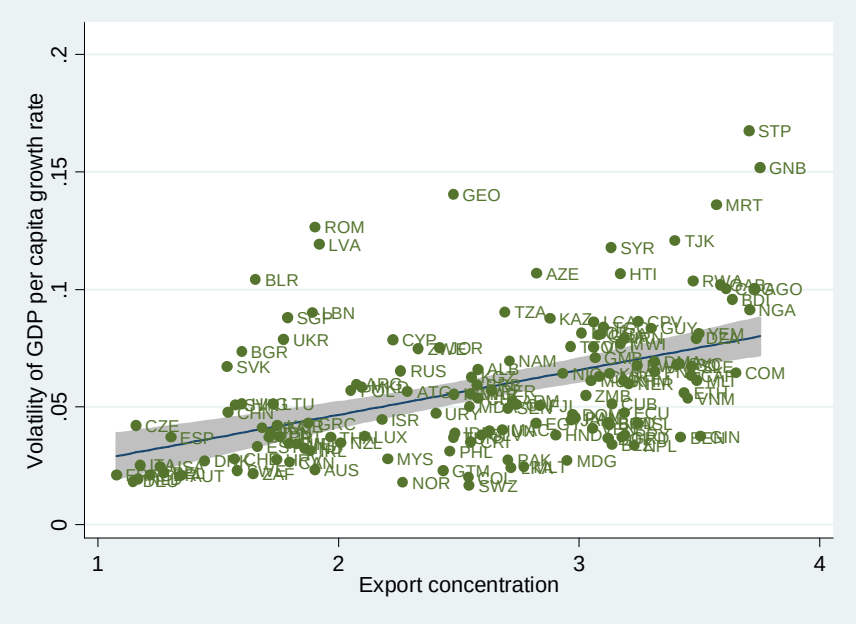
- Instability in economic performance critical for many developing countries
  - Uncertainty lowers private investment and leads to slower growth
  - Increases inequality and poverty
  - Instability can result in crises

Determinants of Volatility

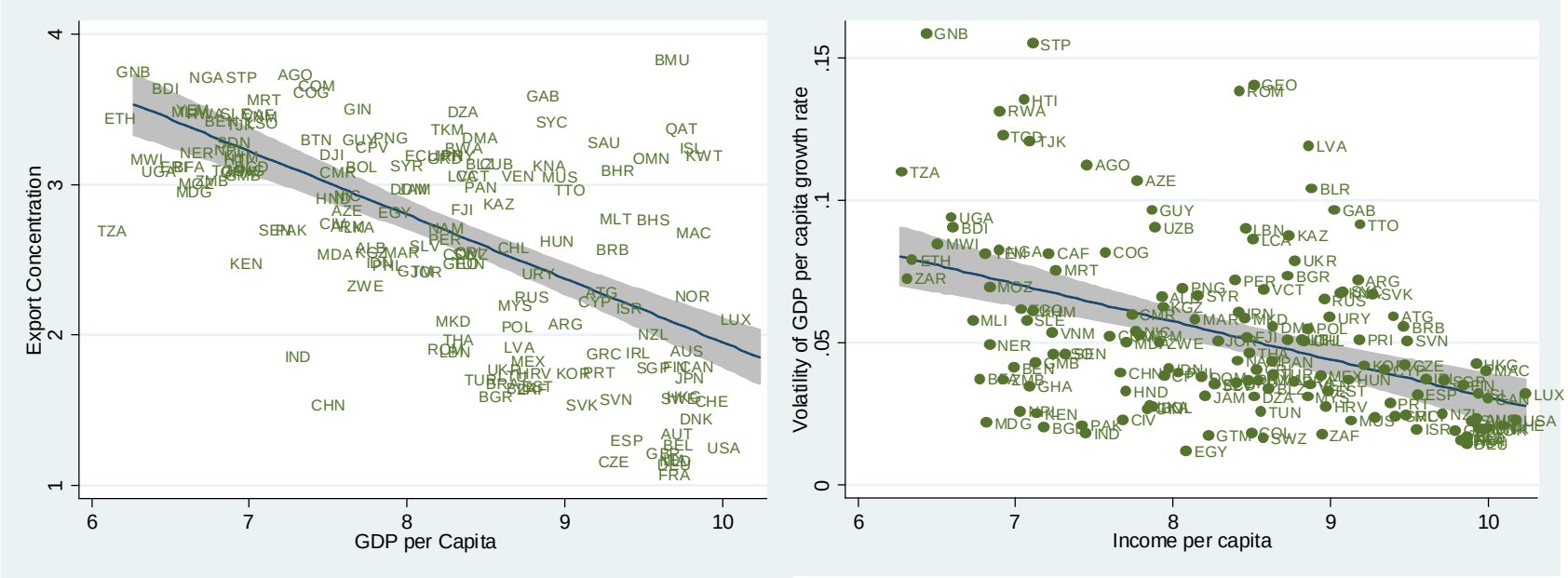
- Policy Mismanagement (Fatas and Mihov, 2003, QJE)
- Financial Institutions (Easterly et al. 2001, WB)
- Political Institutions (Acemoglu et al., 2003, JME)
- Export Concentration and Geography (Malik and Temple, 2009, JDE)

Determinants of Volatility: Institutional Constraints and Export Concentration





Export Concentration versus Income per Capita



Causality and Model Uncertainty

- Instrumental Variables
  - Acemoglu et al. (2003, JME): Institutions versus policies
- Bayesian Methods
  - Malik and Temple (2009, JDE): Geography and export concentration
- Panel Data
  - Yang (2008, JM): Influence of democracy depends on ethnic homogeneity
- Here: New instrument for export concentration based on geographic characteristics

Approach

- Use geographically determined component of export concentration as an instrument for actually observed export concentration to study influence on external volatility

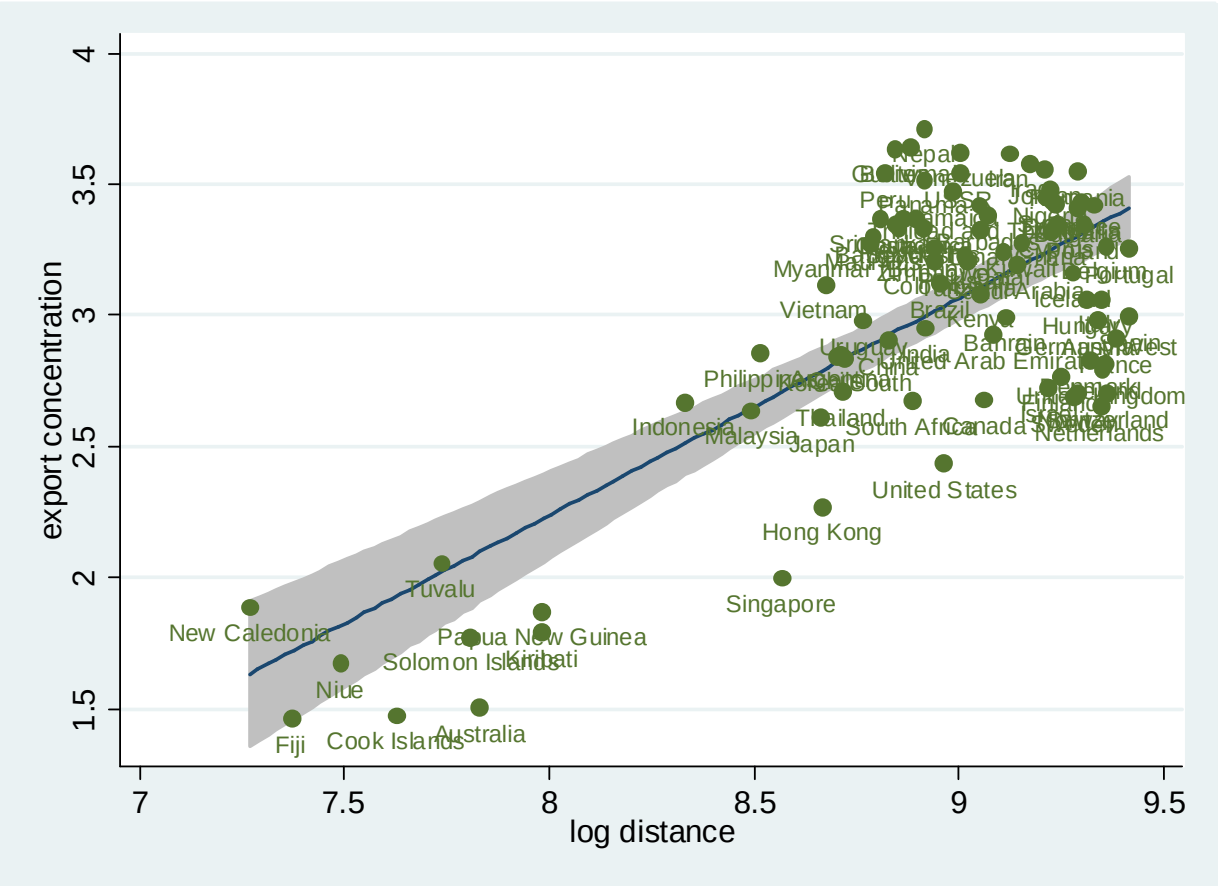
- Remoteness as a natural barrier to trade (Malik and Temple, 2009)
  - Transport costs affect sectors differently (imported intermediate goods)
  - countries may be locked into concentrated export structures

- Export concentration determines how external shocks are absorbed
  - Terms of trade: Undiversified countries are hit more severely by price shocks
  - Exports: Diversification dampens exposure to demand shocks
  - Exchange rates: currency demand fluctuates with exports

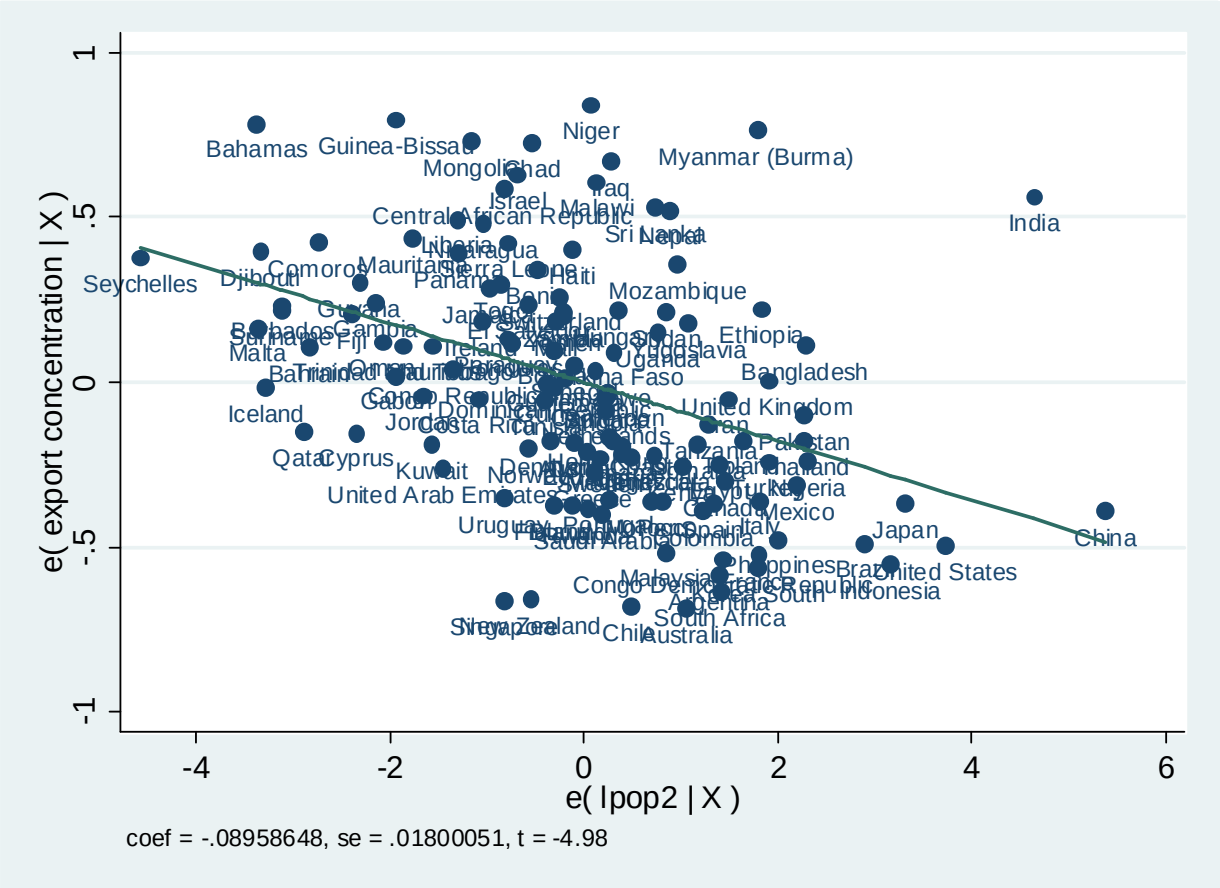
Geography-based Instrument for Export Concentration

- Appropriately weighted average of countries' remoteness (based on Frankel and Romer, 1999)
- Include information about distance, population, area, landlocked, border
- Do not use common geographic variables
  - Distance from equator and tropical area (Sachs, 2003)
  - Soil quality (Sokoloff and Engerman, 2000)
  - Coastal area (Acemoglu et al., 2005)
- Control for trade
  - Remoteness reduces trade; Increased specialization induces more volatility (di Giovanni and Levchenko, RES, forthcoming)

New Zealand: Influence of Distance on Export Concentration



Belgium: Influence of Trading Partner‘s Size on Export Concentration (Controlling for Distance)



Method

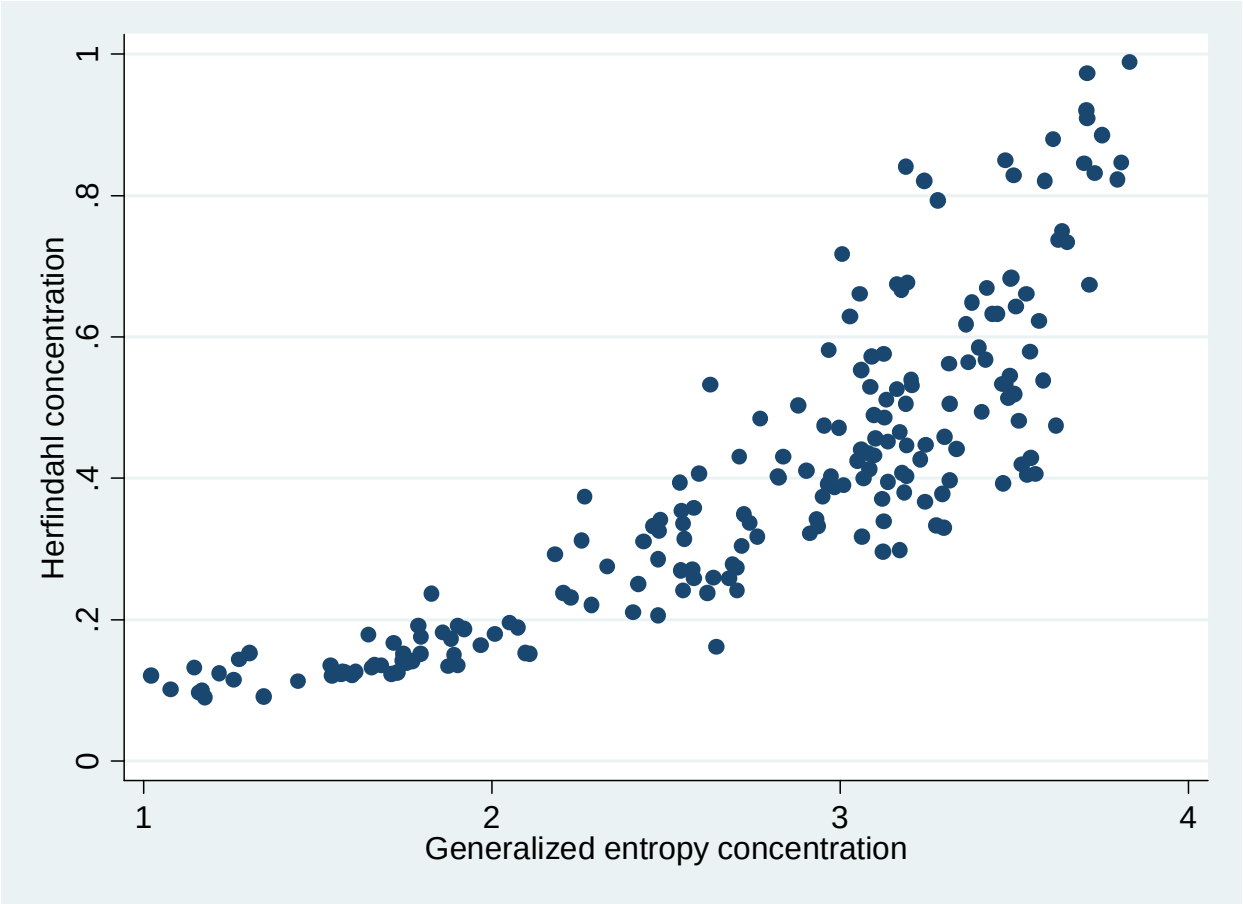
- Estimate bilateral export concentration equation
- Include only purely geographic determinants
- Aggregate fitted values to estimate a geographic component of countries' overall export concentration
- Problem: bilateral export concentration cannot be easily aggregated across countries (as is the case for trade)
- Solution: use an additively decomposable inequality measure

Generalized Entropy Inequality Measure…

$$GE_{i,j} = \frac{1}{\alpha(\alpha-1)}\left[\frac{1}{n_{i,j}}\sum_{h=1}^{n_{i,j}}\left(\frac{x_{h,i,j}}{\mu_{i,j}}\right)^{\alpha} - 1\right]$$

- x value of trade in product *h* between country *i* and country *j*
- n number of products traded
- μ mean value of trade flows across products
- α inequality weighting parameter (set to 0.5)

Concentration Measures Compared



… allows Decomposition by Export Country

$$GE_i = \frac{1}{\alpha(\alpha+1)} \sum_j \left[1 - \left(\frac{X_{i,j}/X_i}{N_{i,j}/N_i} \right)^{\alpha} \right] + \sum_j \frac{N_{i,j}}{N_i} \left(\frac{X_{i,j}/X_i}{N_{i,j}/N_i} \right)^{\alpha} GE_{i,j}$$

- Where the first term is the concentration between all bilateral trade relationships for country *i,*
- and the second term is the concentration within each bilateral trade relationship
- Thus, we need to estimate $X_{i,j}$, $N_{i,j}$, and $GE_{i,j}$

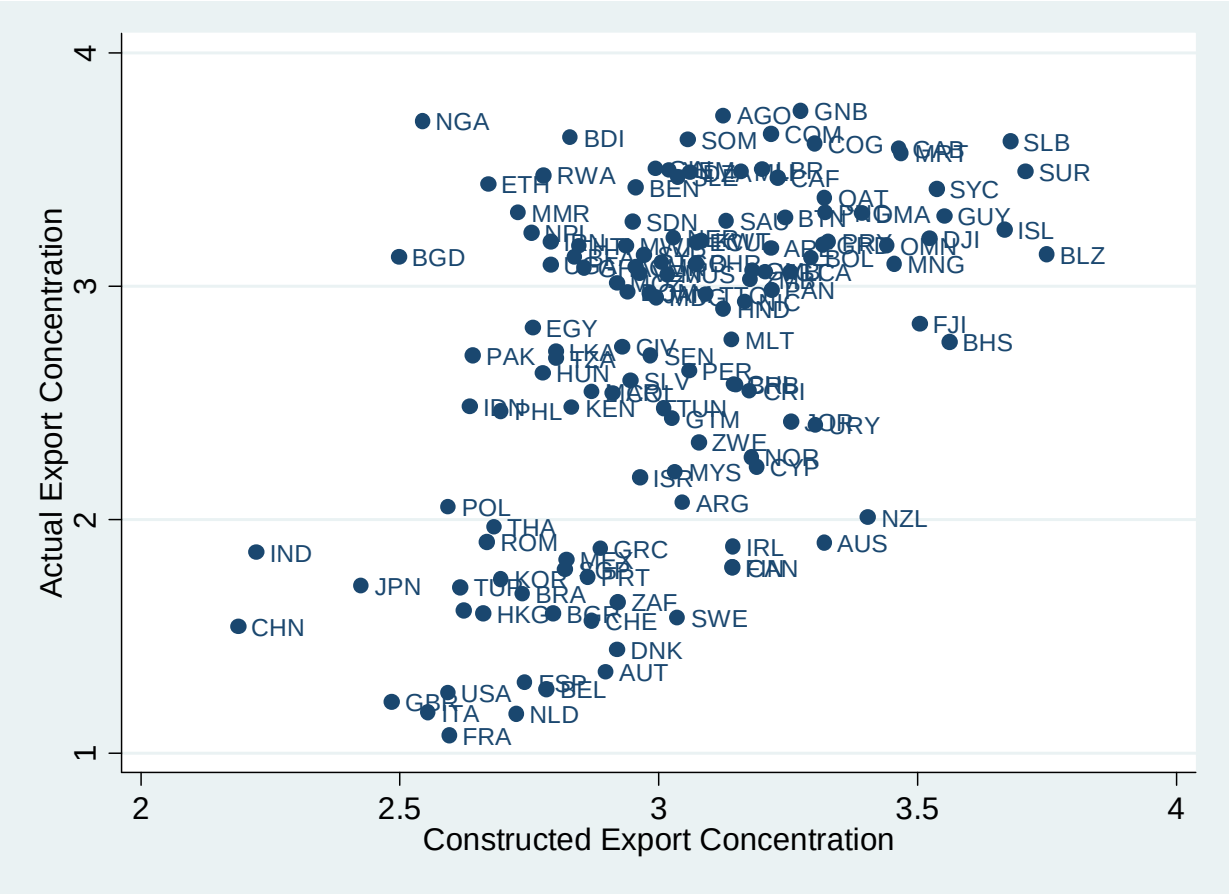
Data

- Export concentration:
  - Concentration across products (4-digit SITC)
  - Comtrade dataset; averaged over 1980-2000
- Volatility (standard deviation; WDI)
  - Terms of trade
  - Real effective exchange rate
  - Export growth
- Gravity variables from Frankel and Romer (1999)
- Trade openness (EX+IM / GDP; WDI)
- Institutional environment (Aggregate Governance Indicators)

How does Geography Influence Concentration?

Dependent Variable	Bilateral export concentration		Bilateral exports		Bilateral trade flows	
	Number of sectors				Frankel/Romer	
	all	> 50	ln Export value	ln Number of sectors	original values	Comtrade values
ln distance	0.213***	0.212***	-0.583***	-0.243***	-0.85***	-1.225***
	(0.007)	(0.008)	(0.033)	(0.011)	(0.04)	(0.036)
ln population (country i)	-0.262***	-0.246***	0.663***	0.270***	-0.24***	-0.411***
	(0.003)	(0.005)	(0.020)	(0.006)	(0.03)	(0.030)
ln area (country i)	0.100***	0.094***	-0.164***	-0.094***	-0.12***	-0.012
	(0.003)	(0.003)	(0.016)	(0.005)	(0.02)	(0.023)
ln population (country j)	-0.042***	-0.025***	0.718***	0.085***	0.61***	1.400***
	(0.004)	(0.005)	(0.019)	(0.007)	(0.03)	(0.028)
ln area (country j)	0.010***	-0.005	-0.184***	-0.011**	-0.19***	-0.307***
	(0.003)	(0.004)	(0.016)	(0.005)	(0.02)	(0.023)
Landlocked dummy	0.107***	0.033**	-0.905***	-0.148***	-0.36***	-1.149***
	(0.011)	(0.014)	(0.060)	(0.021)	(0.08)	(0.103)
Common border dumm	-0.231***	-0.075**	0.426***	0.123***		
	(0.039)	(0.038)	(0.156)	(0.045)		
Constant	4.800***	4.275***	7.103***	3.120***	-6.38***	-7.725***
	(0.068)	(0.086)	(0.351)	(0.120)	(0.42)	(0.469)
R^2	0.358	0.304	0.319	0.226	0.360	0.455
Observations	12'503	6'773	6'773	6'773	3'220	6'284

Actual versus Constructed Export Concentration



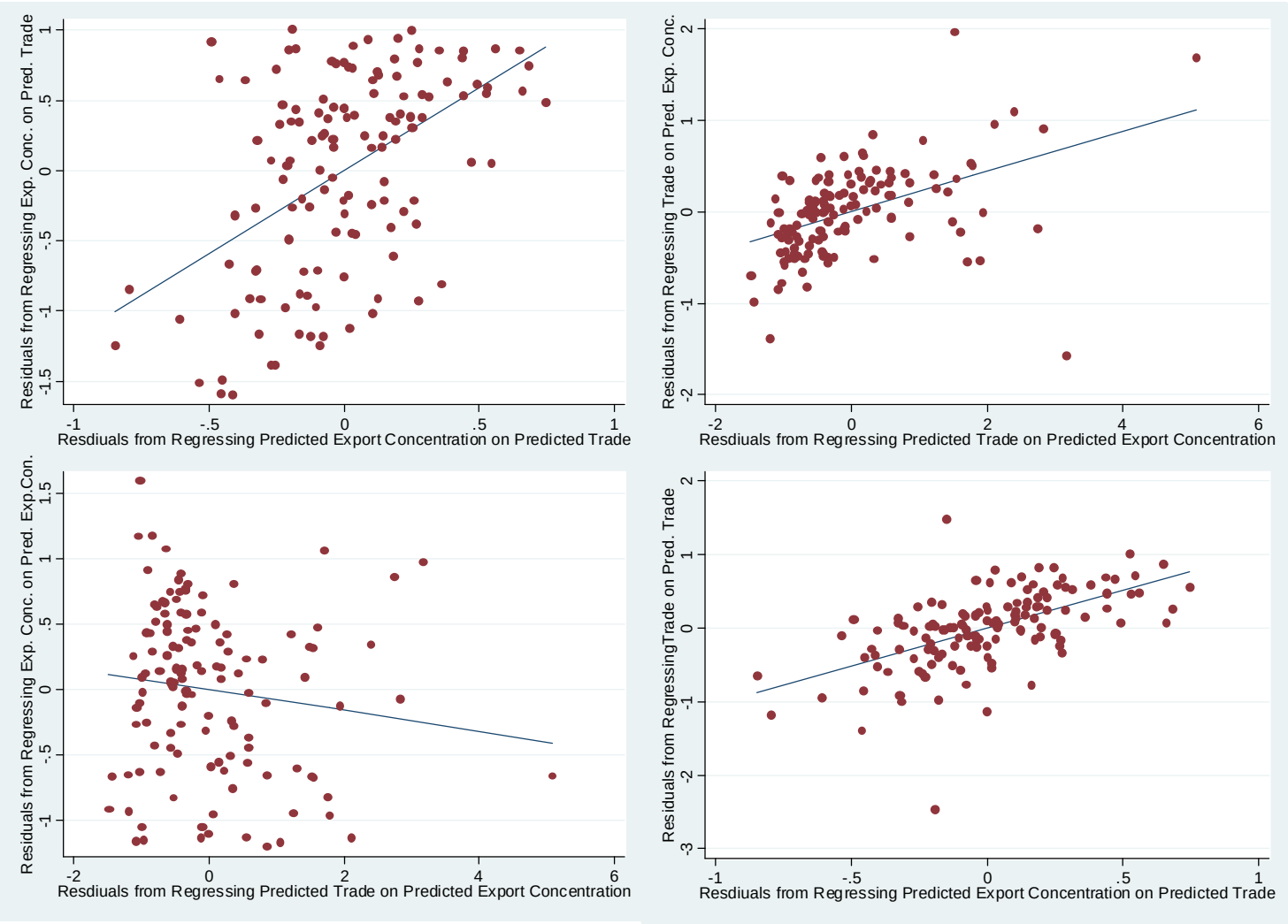
External Volatility and Export Concentration

Dependent Variable	Regressions of Volatility					
	Terms of Trade		Real Effective Exchange Rate		Export Growth	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Export Concentration	0.068***	0.043***	0.054***	0.006	0.076***	0.054***
	(0.008)	(0.013)	(0.012)	(0.023)	(0.010)	(0.019)
Trade Openness	-0.040***	-0.038***	-0.066***	-0.056***	-0.040***	-0.035***
	(0.009)	(0.009)	(0.019)	(0.019)	(0.012)	(0.013)
Constant	0.087**	0.143***	0.248***	0.326***	0.121**	0.161***
	(0.039)	(0.055)	(0.071)	(0.098)	(0.047)	(0.058)
R^2	0.404	0.353	0.323	0.139	0.324	0.296
N	110	110	73	73	127	127
Excluded Instrument		Predicted Concentration		Predicted Concentration		Predicted Concentration

Levels of statistical significance indicated by: *** p<0.01; ** p<0.05; * p<0.1

Numbers reported in parentheses are heteroscedasticity-robust standard errors.

Importance of Controlling for Trade (e.g. ToT)



Export Concentration and Institutions

Regressions of Volatility in Terms of Trade

Method	OLS	OLS	IV 2SLS	IV First Stage Exp. Conc.	IV First Stage Governance
	(1)	(2)	(3)	(4)	(5)
Export Concentration	0.046***	0.047***	0.042*		
	(0.010)	(0.014)	(0.025)		
Trade Openness	-0.017**	-0.011	-0.011	0.008	1.130
	(0.008)	(0.008)	(0.007)	(0.107)	(0.928)
Aggregate Governance	-0.005***	-0.004**	-0.003		
	(0.001)	(0.002)	(0.004)		
Predicted Exp. Concentration				0.505**	2.540
				(0.230)	(2.067)
Settler Mortality				0.323***	-2.394***
				(0.044)	(0.458)
Constant	0.057*	0.024	0.042	-0.302	-1.394
	(0.034)	(0.036)	(0.067)	(0.964)	(6.893)
R^2	0.468	0.384	0.374	0.512	0.431
N	104	58	58	58	58
Excluded Instrument			Predicted Concentration, Settler Mortality	Predicted Concentration, Settler Mortality	Predicted Concentration, Settler Mortality

Levels of statistical significance indicated by: *** p<0.01; ** p<0.05; * p<0.1

Numbers reported in parentheses are heteroscedasticity-robust standard errors.

Robustness Checks

- Overidentification tests using concentration across countries (predicted from weighted bilateral distance) as additional IV
- Control for export shares of various natural resources (oil, agriculture, various raw materials)
- Control for the size of the manufacturing sector: inconclusive results

Conclusions

- Bilateral export concentration is well described by a gravity equation
- Inequality decomposition methods allow to aggregate bilateral export concentration to an overall measure of export concentration
- Predicted export concentration contains valuable information about actual concentration
- Using predicted export concentration as an IV, export concentration exhibits a causal influence on volatility in terms of trade and growth in exports, but not so on volatility in exchange rates
- The instrumental variable is not suited to elucidate the separate roles of institutions and export concentration in determining aggregate volatility